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STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 35

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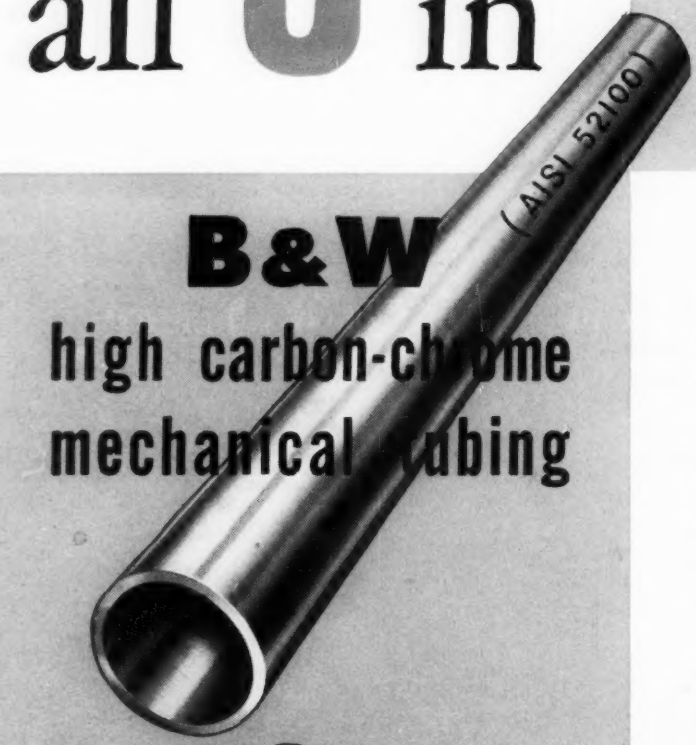

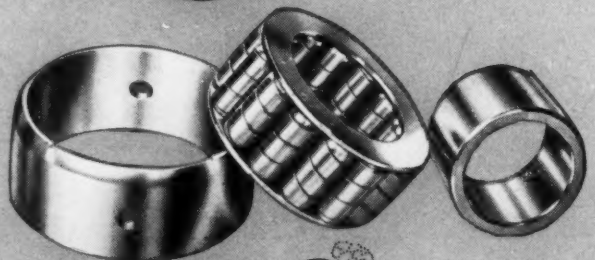

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Organic Finishes for Metal Products

Carbon Refractories in the Blast Furnace

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 123, NO. 1 — JULY 5, 1948

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July 5, 1948

The Greater Sacrifice

From Washington comes the not surprising news that well informed officials in the Department of Commerce are convinced that voluntary allocations are on the way out.

They advance two reasons for this opinion. Public Law 395, under which voluntary allocations are authorized, will expire Mar. 15, 1949. Many months are required to set up allocation programs. Therefore, any program that would become effective before the law expires would have to be instituted before Sept. 15, 1948.

Secondly, the Ploeser amendment to the Selective Service Act provides for mandatory priorities in procuring steel for the three armed services and the Atomic Energy Commission. It will be confusing for the steel industry to try to allocate part of its output under voluntary agreements at a time when it is subject to mandatory allocation of another portion of its output.

Therefore, it will not be surprising if we witness a gradual disintegration of voluntary allocations. In this event, there will be a strong temptation for the advocates of government controls to urge that mandatory priorities be shoved into the vacuum caused by the withdrawal of the co-operative program.

Thus the very thing which many have feared will have materialized. We will have a far greater measure of government control in peacetime than Congress intended. We will have it because there is no effective way of stopping the growth of controls once a start has been made. One control leads to another.

Last week on this page it was stated that the introduction of mandatory priorities in time of peace constitutes a dangerous precedent that will make it easier for future administrations to seek drastic powers on even flimsier pretexts. A reader criticizes this view on the ground that if young men are drafted, industry should be willing to make whatever sacrifice is involved in mandatory allocations.

It must be agreed that equality of sacrifice is important. But if degree of sacrifice is to be a factor in this problem, then the nation should consider another phase of sacrifice of major import. Are we wise in granting to the federal government increasingly drastic powers in peacetime which may eventually force the people to sacrifice the freedom of action that has made this nation great?

* * *

A GOOD CAUSE FAILS: Overwhelming evidence points to the distasteful conclusion that the various individual attempts by industrial corporations to buck the trend of inflation have failed. The General Motors settlement, reinforced by the gains won by the United Mine Workers, removed the last remaining obstacles to more or less general third-round wage advances. U. S. Steel, General Electric and others who made efforts to stem the tide are helpless in the face of the recent flood of wage grants.

As a result, a new surge of price advances is in the offing. Higher prices for finished steel can be expected shortly and it is probable that some steel companies will grant wage increases before Labor Day, notwithstanding the fact that their contracts with unions provide that no wage increases need be considered until the spring of 1949.

Collapse of the well-intentioned industrial anti-inflation movement probably means that henceforth no corporation—however powerful it may be—will attempt single-handedly to re-

(OVER)

sist the national trend. Experience has shown that there are so many factors beyond the control of industry involved in inflation that the action of one, or even of several, industrial corporations has too little influence.

Failure of industrial companies to stop the upward spiraling of prices does not mean that the effort was entirely wasted. Actually the tactics of U. S. Steel and others slowed the pace of inflation. Also, years hence when historians are discussing America's postwar inflation in retrospect, industry's record will look better by virtue of these attempts. —p. 43

* * *

HALTS INVASION TREND: A backward glance at the record of the 80th Congress shows that the Republican majority, with the help of many Democrats, did a pretty good job of blocking further encroachment by the federal government into the field of private business.

The administration's proposal to build a $54 to $84 million steam power generating plant in TVA territory was turned down as an improper invasion of private enterprise. Several hydroelectric projects were thrown out because they would compete with privately owned public utilities. The majority in Congress seemed to believe that the government should be in the power business only when hydroelectric power is a byproduct of sound flood prevention or river improvement projects.

This stand against the ever growing entry of government into competition with private business is encouraging. It should be maintained firmly. —p. 50

* * *

THE ABC OF FORGING: In the opinion of a number of qualified critics, the series of articles entitled "Fundamentals of Forging Practice," now appearing in this publication, will be a noteworthy contribution to the limited literature on forging.

Readers who have read the first two installments in previous issues doubtless have noted the fact that the author, Waldemar Naujoks, writes simply and clearly. Thus far he has dealt with the elementary phases of forging practice and it may be that some of the super-technical men in the forging industry are beginning to wonder whether the series of articles is intended for novices or veterans.

Readers need have no doubts on this point. When the author gets into the more intricate problems of forging practice, his clarity of expression will appeal strongly to all who are interested in the subject—whether they be at the bottom, middle or top of the ladder of advancement in the technology of forging.—p. 76

* * *

ENVIABLE FIRST-HALF: In spite of material shortages, work interruptions, model changes and other handicaps, the automobile industry chalked up a production record of more than 2,600,000 vehicles in the first half of 1948. This exceeds output for the first six months of 1947 by a modest margin. Assemblies in 1948 exceeded those in 1947 in every first-half month except May.

Prospects for the last half of the present year are clouded by the same uncertainties that have plagued the industry since the end of the war, plus the question as to whether European aid and preparedness will divert steel tonnage from motordom's quota. In 1947, motor car manufacturers turned out 100,000 more vehicles in the second half than in the first half. If this feat can be repeated in 1948, the total annual output will be in excess of 5,300,000 units—an excellent performance. —p. 57

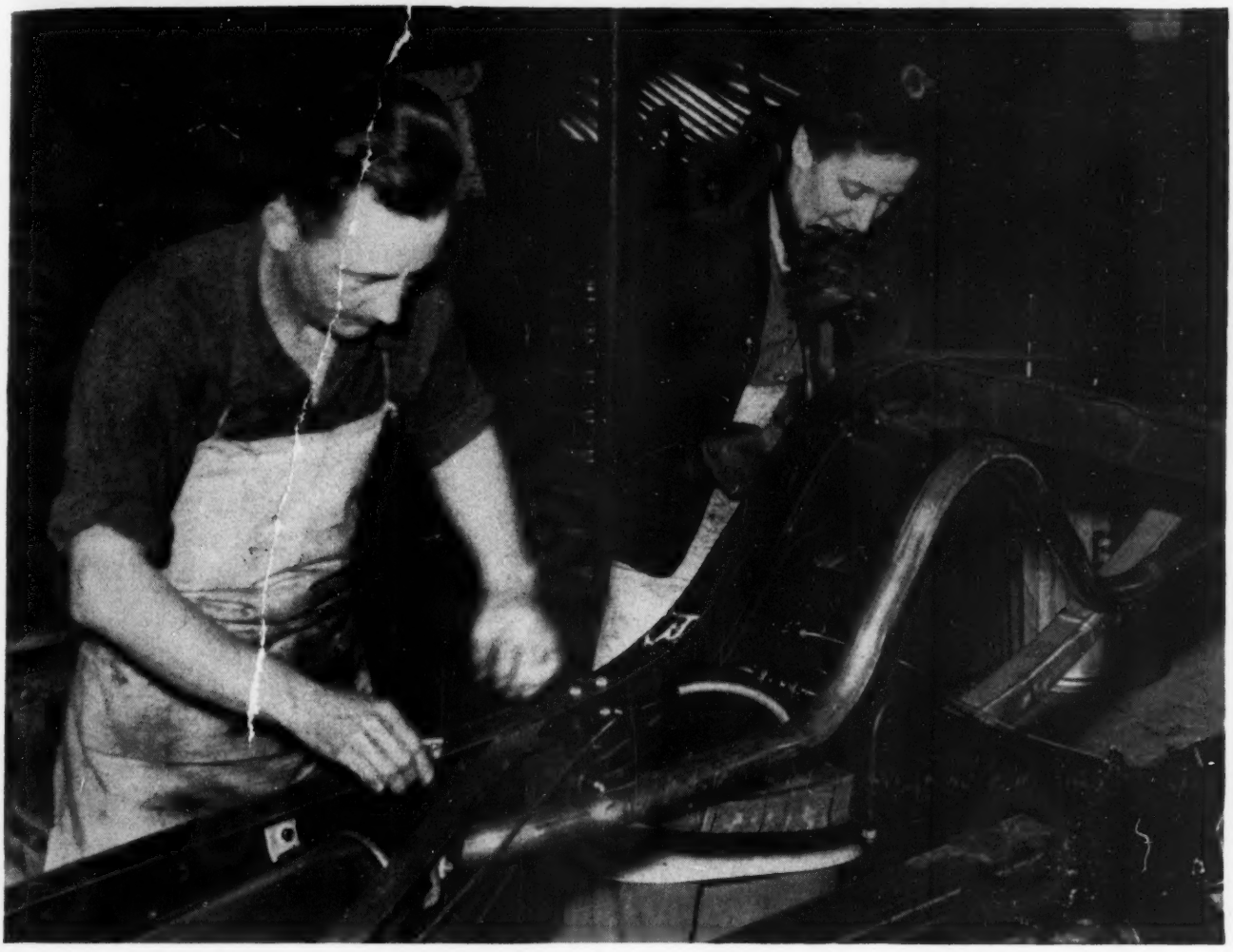
* * *

SCRAP YIELD SHRINKS: Machine Tool Editor Guy Hubbard, whose frequent visits to metalworking plants throughout the nation give him an unusual opportunity to note significant trends in manufacturing techniques, is impressed by the extent to which the scrap metal removed from parts in forming and machining operations is being reduced gradually. "Can it be possible," he asks, "that the current shortage of scrap is due in substantial degree to the fact that the ratio of scrap to finished parts is being cut to the bone?"

This point certainly has important implications—especially in the long-term prospects for scrap supply. Every foundry, forge shop, metal stamper, machine shop or other metalworking establishment is striving constantly to work more closely to the dimensions of the finished piece, thus reducing the amount of metal discarded in finishing operations. This is bound to affect the scrap situation. It is a factor that must be considered in solving the nation's important problem of restoring, or finding a substitute for, its priceless prewar scrap cycle. —p. 86

E. L. Shaner

EDITOR-IN-CHIEF



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50 MONEL LOUVERS *in 15 different sizes went into the buildings of this eastern refinery. The accompanying story told how the use of Monel actually cut the first cost. However, when you use the INCO Nickel Alloys you also get an even bigger saving from their longer service life.*

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"Task Metals" for Industry

News Summary

PRICES AND WAGES— The steel industry soon will kiss its anti-inflation program good-bye. Higher prices for steel products and higher wages for steelworkers now are accepted as inevitable (p. 43); the only question that remains is how soon and how much. The upward adjustments, which are being forced by third round wage increases granted in other industries and by steadily increasing costs, will come before Sept. 1, perhaps much sooner. Settlement of the soft coal mine dispute, which will cause substantial increases in the cost of coal and coke (p. 44), wiped out the last hope that the steel industry could hold its line on wages and prices.

ALLOCATIONS— Grave doubts as to the continuance of the voluntary allocations program were being voiced (p. 45) in industrial circles last week as the result of: (1) Granting the administration mandatory allocation powers over steel for the armed services and (2) failure of Congress to extend Public Law 395 beyond next Mar. 15. Should the administration invoke its mandatory powers, granted in a rider to the draft act, the voluntary allocations would be over-ridden. Expiration of the law authorizing voluntary allocations next March creates a time problem inasmuch as about six months are required to set up a voluntary program.

PRICING— Announcement by the cement industry that it will adopt an f.o.b. mill pricing system this week was read with interest by steel and metalworking executives (p. 47). Steel companies are giving considerable study to their future pricing policies in light of recent court decisions. One suggestion heard in industry circles is that the forthcoming steel price increase may be effected by retaining present quotations and moving to an f.o.b. mill system, allowing the buyer to pay the freight now absorbed by the producer.

FREIGHT RATES— Industrial traffic men are speculating over the possibilities of a new freight rate increase being allowed the railroads later this summer (p. 48). Settlement of the current railroad wage dispute may determine how much and when new rate adjustments are made.

AUTO OUTPUT— Independent companies generally are producing in greater volume than they did last year and in some cases are exceeding 1941 records (p. 57), indicating they have licked their materials and parts supply problems to a large extent. Extraordinary measures have been necessary to do this in some cases, with several automakers purchasing their own steel facilities. The Big Three on the other hand have been able to make only slight improvements over 1947 output.

FOREIGN— Production of the first steam road roller in India was hailed as an important step toward that country's industrialization and the first unit produced was "launched" with much ceremony (p. 53). . . . Europeans are watching the American political scene closely, wondering what developments mean in the way of foreign aid, reconstruction of Germany, etc. . . . Construction of Chile's steel plant is under way.

CONCENTRATING TACONITE— Announcement that Erie Mining Co.'s pilot plant for concentrating the abundant iron-bearing rock, taconite, will start operations and shipments this month is being greeted with tremendous interest. It may bring a practical and economical substitute for the diminishing supplies of direct-shipping ore (p. 49).

SIGNS OF THE TIMES— A new "mill pool" warehouse opened by Crucible Steel Co. at Harrison, N. J., the third such unit, will improve that company's steel distribution (p. 60). . . . Ford's tooling for new models (p. 58) cost $72 million. . . . Light metal users face gloomy prospects (p. 55) on the West Coast due to power shortages. . . . A final look at the legislative record of the 80th Congress shows encouraging resistance to the opponents of private enterprise (p. 50). . . . Export procedure for some metal products (p. 52) has been modified, with validity periods of licenses extended to six months. . . . Requests for steel and machinery for the foreign aid program (p. 50) are becoming more substantial.

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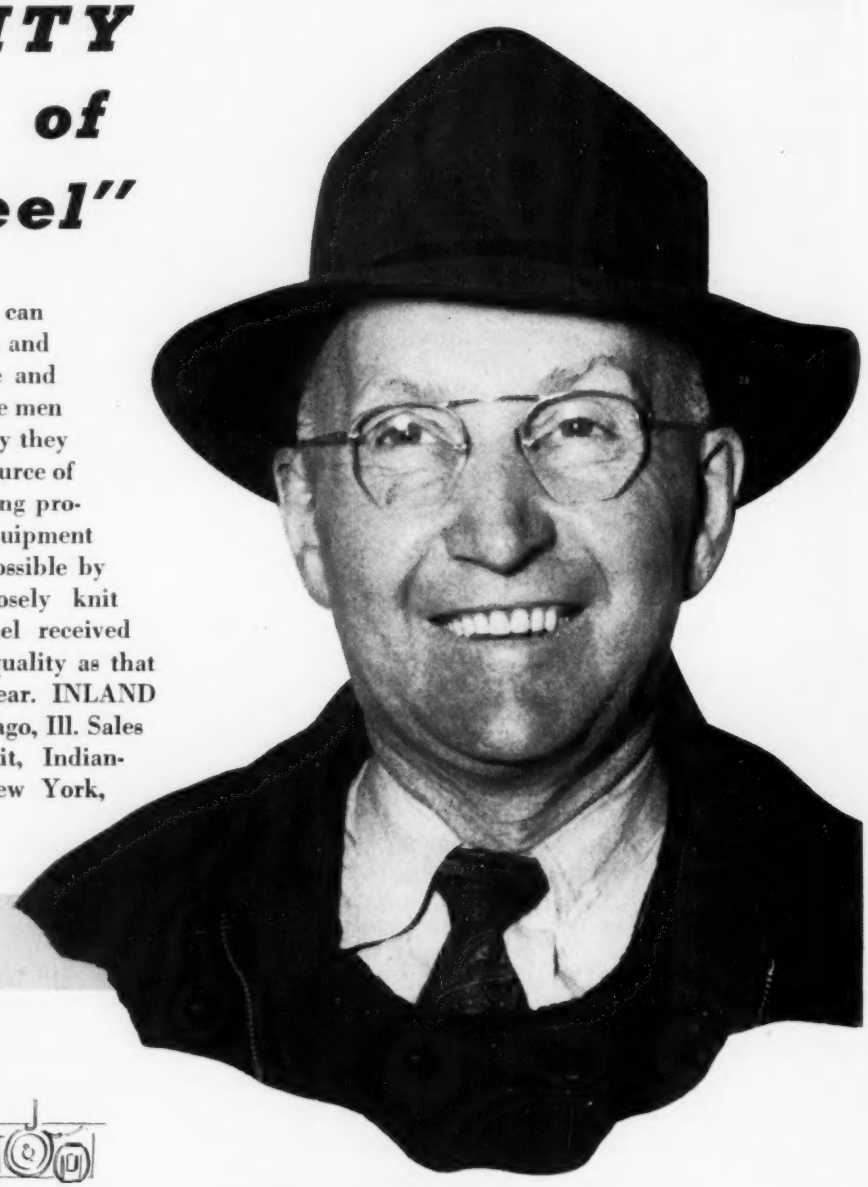

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STEEL
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Anti-Inflation Program Scuttled

Wage and price increases destroy industry's attempt at stabilization. Adjustments in steel wages and prices expected soon. Coal settlement raises costs

LOOK for higher steel prices before the summer is over.

This is the opinion circulating freely—though unofficially—through the industry.

The granting of third round wage increases by the automotive, electrical, aluminum, rubber and coal industries will force reconsideration of the wage problem by the steel industry. Consensus is that an upward adjustment will be granted this quarter.

When wages go up, steel prices will go up.

This means that heavy industry's anti-inflation program, based on refusal of third round wage increases and reductions in prices of its products, has failed. The attempt at stabilization was spearheaded by the larger steel companies and the big electrical manufacturing companies.

GM Opened Dike—For a time it appeared that the industry had a fair chance of success. United States Steel, General Electric and others denied demands of the unions for substantial wage increases and simultaneously announced price reductions. Labor leaders protested, but not effectively. The United Steelworkers had a two-year contract with the basic steel industry. This prohibited strikes for the life of the agreement but permitted reopening this year for consideration of wage adjustments. When the steel industry refused an increase, the union stated it would honor its no-strike pledge and the matter apparently was closed.

Other unions, however, continued to press for a third round increase. The strong United Automobile Workers, under threat of strike, gained the first major concession from General Motors which granted an 11-cent adjustment and an agreement hitching future wage rates to the cost-of-living index.

This opened the dikes and the anti-inflation program was washed out. Other automakers granted flat wage increases, avoiding the GM policy of gearing wages to living costs. The increases spread through other mass production industries.

Prices Go Up—Price advances followed hard on the heels of the wage increases. Companies which had reduced prices at the launching of industry's stabilization program reversed themselves and either canceled reductions or announced new increases.

Auto prices were marked up as much as $200. Aluminum Co. of America raised pig and ingot prices 1 cent a pound, the first basic aluminum increase in 11 years. The coal wage settlement necessitated higher prices for coal and coke. Refractory brick prices advanced. Brass mill products were marked up. A number of electrical products rose. Freight rates had been advanced substantially several weeks before.

Steel Is Next—Although the steel wage contract legally continues through next April, few people in the industry believe the producers will hold to the letter of the contract. Upward wage adjustments will be granted this summer in the interest of fairness to employees and preserving harmony.

While some industry spokesmen believe such action will not come until around Sept. 1, others expect that wage increases will be announced this month.

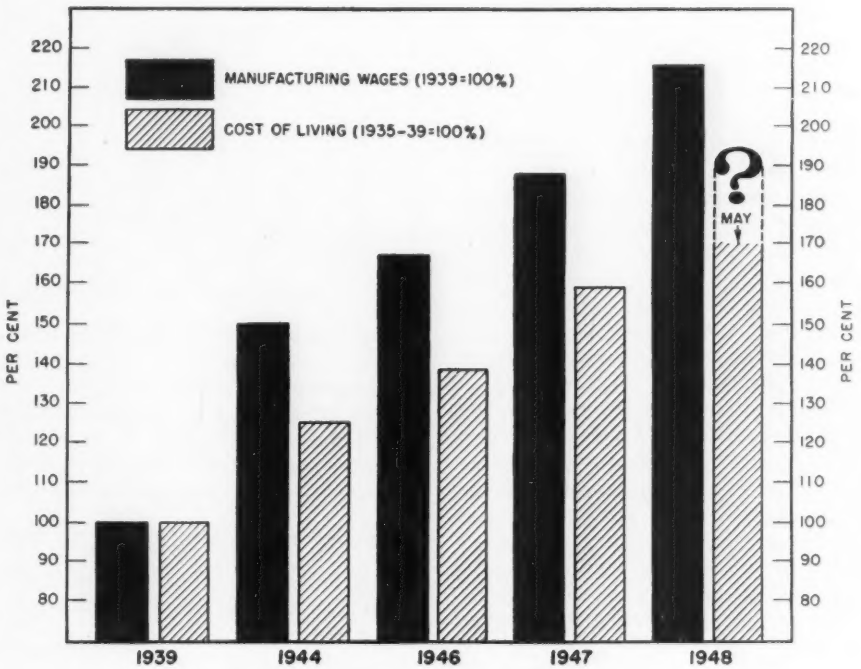
The wage increase probably will be coupled with a social insurance program and be offered the workers as a package.

Simultaneously or soon following announcement of the wage increase, will be the announcement of upward adjustment in steel prices. Steelmaking costs have been mounting steadily since the anti-inflation experiment was launched. Some steel products are being sold by the mills at less than production cost. Leading producers are selling products in some instances at considerably less than smaller competitors.

The increases to be made will be substantial on some steel products and moderate on others. No one in the industry is venturing an estimate as to the average advance, but most steel sellers believe it will more than wipe out the recent price reductions.

Already Alan Wood Steel Co., Conshohocken, Pa., has granted its employees a 10-cent hourly increase, of which 5 cents is in form of a direct wage increase and 5 cents goes for a new group insurance program.

Pricewise, Pittsburgh Steel Co. has advanced prices of certain oil coun-



WAGES LEAD LIVING COSTS IN UPWARD RACE

try tubular goods, including casings and oil well tubing, by 26.8 per cent.

See Cost-of-Living Increase — To impartial economists the third round of wage increases and price advances means another spiral of inflation. The cost of living, they point out, will react quickly to the recent price advances, and any benefits in the way of wage advances gained by the organized workers will be washed out by the higher prices.

Wages and prices have been chasing each other upward ever since the end of the war (see chart, page 43). Since 1939, manufacturing wages have more than doubled. Cost of living index had increased more than 70 per cent to mid-May, will go higher as new prices advances are reflected.

Coal, Coke Prices To Increase

HIGHER prices for coal and coke became a certainty with the granting of a $1 a day wage increase to soft coal miners and doubling of the contribution to the miners' welfare fund (now 20 cents a ton).

Coke prices are expected to be increased from 50 to 75 cents a ton. Retail coal dealers say they will have to raise prices 75 cents to $1 a ton, to compensate for the increased cost of coal at the mines and for higher truck drivers' wages and increased freight rates.

Based on an average production of 6 tons of coal per day per miner, the indicated increase in cost of coal at the mine would be about 27 cents, 17 cents in wages and 10 cents in increased royalties for the welfare fund. This, however, will vary considerably from mine to mine depending on the extent of mechanization at each facility.

The settlement between the commercial mine operators and the United Mine Workers averted another threatened nationwide coal strike. Late last week, the steel companies owning "captive" mines had not signed the agreement although they indicated they were willing to grant the wage increase and accept the increased contribution to the miners' welfare fund. They objected to the union shop provision of the new contract, contending such a provision was contrary to the Taft-Hartley Act. The captive mines produce about 60 million tons of coal a year, or about 10 per cent of total output.

The coal settlement gives the miners a welfare fund that will amount to about $100 million a year from which the pensions of $100 a month will be paid miners who have reached age 62 and who have spent 20 years in the mines. It brings the miners' basic wage rate to approximately $14 a day.

OH HUM, ANOTHER STRIKE: Lack of interest by the union rank and file in an International Harvester walkout caused primarily by wrangling over the date an 11-cent pay boost goes into effect is indicated by this lone picket at one plant. Nine of Harvester's 11 units were struck when the United Farm Equipment Workers-CIO pounded the conference table in demanding a retroactive date of June 14 for the pay raise. The company had set the date at June 29. NEA photo

Overtime Deadline Postponed

ENFORCEMENT of a new interpretation of the Fair Labor Standards Act, necessitated by the June 7 Supreme Court decision regarding overtime on overtime in the case of longshoremen, will not go into effect until Sept. 15. Previously the new enforcement was scheduled to begin July 1, but Labor Department spokesmen said more time is needed for management and labor to bring "union agreements and employer practices into accord with the court's findings."

Idleness Falls as Big Strikes End

IDLENESS arising out of labor-management controversies declined to 4,100,000 man-days in May, as compared with approximately 8 million man-days in April. Bureau of Labor Statistics reports that the largest factors in the reduction of lost time were the termination of the bituminous coal stoppage in mid-April and, to a lesser degree, the meat packing strike which was brought to a virtual close toward the end of May.

The number of new work stoppages (275) remained the same as in April. Approximately 165,000 workers were involved in labor-management disputes which broke out in May. The largest stoppage beginning in the month was that of about 75,000 CIO auto workers at Chrysler Corp.

Including those stoppages which continued into May from earlier months, a total of 425 disputes were in effect during some part of the month. The total number of workers involved approximated 350,000. In May a year ago, 781 work stoppages, involving nearly 700,000 workers, were in progress.

Voluntary Allocations on Way Out?

Adoption of mandatory allocation powers for procuring steel for military, plus approaching expiration of Public Law 395, threatens early demise of co-operative program

VOLUNTARY allocations soon may pass out of the picture. This is the opinion of Department of Commerce officials directing the program. They cite two reasons for expecting an early demise of the program.

First, Public Law 395 will expire Mar. 15, 1949. There will be little merit in instituting a new voluntary steel allocations program after September. Considerable time is required to set up and arrange a program. Then allocated tonnages must be spread on rolling mill schedules and shipments must be made. Under present conditions, the whole process takes months to consummate and Commerce officials believe that programs to be executed before Mar. 15 must be completely set up no later than Sept. 15.

Second, the Ploeser amendment to Section 18 of the Selective Service Act, providing for mandatory priorities in procuring steel for purposes of the three armed services and the Atomic Energy Commission, has taken the steam out of the voluntary agreements program as far as the Commerce Department is concerned. Commerce officials are waiting to see whether the President will invoke the powers to use mandatory priorities in obtaining steel. If the President decides to make use of this power, then Commerce officials will recommend an immediate cessation of the voluntary allocations program. The Commerce view is that steel producers should not be asked to accept so impractical an assignment as having to be in a state of readiness to accept substantial voluntary allocations on the one hand and mandatory allocations on the other.

Reluctant To Use Powers — The military is reluctant to use the new mandatory priority powers granted in the draft act. The armed services would prefer to use the voluntary system as far as possible and hold the mandatory allocation power is reserve for an emergency.

The armed services last week estimated military needs for steel products for fiscal year 1949 at 1,269,131 net tons of carbon and alloy steel. This would be equivalent to 2.1 per cent of 1947 production.

They believe use of mandatory steel procurement powers would not be necessary if the Justice Department came through with a ruling that military steel requirements could be met under the Commerce Department's voluntary allocations program. Originally Justice felt that Public Law 395 would have to be amended to permit voluntary allocations of steel for the military arms. However, it subsequently changed its mind to the extent of permitting voluntary allocation of steel for the Atomic Energy Commission. Since then it has been assumed that Justice would give its blessing to including both military and foreign aid requirements under the voluntary program.

BUT IT WAS LOADED

REPRESENTATIVE Walter C. Ploeser, chairman of the House Small Business Committee and father of the draft industry rider to the Selective Service Act providing mandatory allocation of steel for defense, has written Defense Secretary James V. Forrestal that the sole purpose of the amendment was to help small business get a fair share of defense work. It was not intended, he said, as an opening wedge in reviving government controls over industry.

Now that it has become apparent that the voluntary program is threatened in view of the failure of Congress to extend the expiration date, administration officials are going to proceed cautiously in deciding what they will do with the mandatory priorities power bestowed by the Ploeser amendment. With the voluntary program due to pass out of the picture very soon for all practical purposes, one official told STEEL, the administration will want to retain at least on a standby basis its present mandatory priority powers. These include not only the Ploeser powers covering steel for the armed services and the Atomic Energy Commission, but also the power to use mandatory powers in obtaining steel for export under the foreign aid program.

Virden Sees Conflict—In a hearing of the House Interstate and Foreign Commerce Committee June 29, John C. Virden, director of the Office of Industry Cooperation, stated flatly that if the Ploeser powers are used by the administration he individually would recommend immediate termination of the voluntary procedure under Public Law 395.

Responding to members of the committee, he made it clear that there is only a remote possibility of launching new voluntary allocations programs.

This situation may change if the administration takes an outright stand against use of the mandatory powers and for continuance of the co-operative programs.

Spot Assistance Unlikely

PROSPECTS for setting up a spot assistance program to take care of hardship cases among small steel consumers are not bright. The Office of Industry Cooperation and various congressmen have been working toward such a program but so far have been unable to come up with anything workable and effective.

Organization of state and local hardship committees, obtaining complete representation of steel warehouses in the program and working out other details, present a formidable task.

OIC Director Virden last week told Sen. Kenneth Wherry (Rep., Nebr.), leading advocate of the spot assistance program, that the original concept of such a program probably would be unworkable.

Two other programs, however, are being pushed by OIC at White House request. One concerns allocations for promoting the stockpiling program and the other for rendering assistance to stricken communities, such as those along the flooded Columbia river.

Opposes Petroleum Program

FURTHER complicating the voluntary steel allocations picture, Chairman Walter C. Ploeser of the House Small Business Committee has written the Justice and Interior departments holding that steel for the petroleum program cannot legally be allocated under a voluntary agreement.

He contends there are divergencies of opinion as to whether an oil shortage will develop in the near future and says "Public Law 395 in our opinion was not intended by Congress to be used to permit any industry to suspend the antitrust laws in order to plan against a shortage which might occur in the future. It was intended to be used only where

there was an actual shortage of an essential commodity.

Representative Ploeser holds the petroleum steel plan especially objectionable because it does not make "adequate allowances" for the needs of small independent petroleum producers and refiners.

Atom Project Steel O.K.'d

ATTORNEY General Clark and Commerce Secretary Sawyer have approved the voluntary agreement providing approximately 160,000 tons of steel products during the next eight months for U. S. Atomic Energy Commission construction projects.

The commerce secretary has sent requests for compliance to the 30 steel-producing companies participating in the agreement which was developed by Office of Industry Cooperation, the steel industry and the Atomic Energy Commission.

Iron Allocations Approved

APPROVAL for allocation of 114,000 tons of pig iron monthly for housing has been announced by the Department of Commerce. During the next 8 months more than 900,000 tons will be channeled to the producers of cast iron products for new homes.

OIC Steel Approved for Furnaces

ABOUT 450 manufacturers, most of them small, are being asked to participate in an OIC plan to provide 233,000 tons of steel products during the next eight months for the production of warm air heating equipment. Eligible manufacturers are those who normally secure steel supplies direct from mills and who produce the following items: Warm air furnaces, including jackets and casings; flue-connected floor and wall furnaces; registers and grilles; furnace blowers; furnace pipe; fittings and duct work.

Re-inventory Dodge-Chicago

WAR Assets Administration has started a complete re-inventory of the former Dodge-Chicago engine plant, now occupied in part by Tucker Corp., and will have upwards of 300 inspectors on the site to check and tag every piece of equipment. The agency states the plant has not had a "firm inventory" since being transferred to its jurisdiction by the RFC. Charges of laxity on the part of the WAA in connection with this plant have been aired in Washington in recent weeks. The job of "reconciling a lot of paper surplus to actual surplus" will require a minimum of nine weeks, it is estimated, and could interfere with plans of Tucker to get production of his passenger car under way this summer.

Meanwhile a full-scale investigation of the Tucker Corp. has been initiated by the Securities & Exchange Commission to determine any violation of SEC regulations. Mr. Tucker's allegations that undisclosed persons in Detroit are "fighting" him are dismissed around the motor capitol as mere publicity efforts.

CO_2 Makers Under Attack

LATEST to feel the wrath of the Justice Department and the Federal Trade Commission is the carbon dioxide industry. Suit has been filed in the U. S. Federal District Court for the Eastern District of New York charging Liquid Carbonic Corp., Air Reduction Co. Inc., Pure Carbonic Inc., Wyandotte Chemicals Corp., and International Carbonic Engineering Co. with violation of the antitrust laws. Cease-and-desist orders were issued simultaneously by FTC against some of these defendants.

The government is charging the companies with eliminating competition by price-fixing, pooling patents, conducting price wars against competitors, allocating markets and customers and acquiring plants and properties of competitors.

The Justice Department suit, according to Attorney General Tom Clark, is to secure the divestiture of certain plants and compulsory licensing of some of the defendants' patents. These actions could not be effected by the FTC under its powers.

Justice's Antitrust Division is currently instituting many actions "to probe into the present-day high cost of essential products" and in the carbon dioxide case, the defendants are alleged to have established arbitrary and unreasonably high prices and to have restricted output "to a degree where current demand far exceeds production."

May Blast Furnace Output Up

GAIN of 19.4 points in the blast furnace operating rate from April to May brought the latest month's pig iron, ferromanganese and spiegeleisen production up to 5,077,168 net tons from 3,840,398 tons in the coal strike-affected month. Furnaces were operated at 88.8 per cent of capacity in May. American Iron & Steel Institute's tally of output for the five months through May is 23,971,043 net tons at 85.6 per cent of capacity. Of this total 23,682,485 tons was pig iron and 288,558 tons ferromanganese and spiegel. Of the May total 5,021,385 tons was pig iron and 55,783 tons was ferromanganese and spiegel.

Installs Electric Furnace

A fifth electric furnace has been installed at the Ford Rouge plant, the unit recently having been purchased from the government and moved from the new steel foundry building. The electric furnace department has been averaging about 23 heats a day, or roughly 400 tons, and the new installation, scheduled for operation July 10, will add another 100 tons a day of low-carbon rimmed steel.

To accommodate the new furnace, a 245-ton balcony in the building had to be lowered 3 feet 8½ inches to make it suitable for a charging floor. This was accomplished by nine hydraulic jacks mounted on built-up cribbing of railroad ties. The foot balcony was lowered 9 inches in the first hour, with two men on each jack, and brought to its final position at the end of the shift.

Symington-Gould Buys Foundry

SYMINGTON-GOULD Corp. has purchased an armor steel casting plant at Depew, N. Y., from War Assets Administration for $408,314 and plans to spend an additional $75,000 within the next 18 months in making capital improvements.

The corporation, wartime operator of the plant, has been occupying a portion of it since Aug. 8, 1947, when it was taken over by WAA. Sale includes 16 buildings, among them a foundry extension to the purchaser's existing plant, and certain equipment used in the production of steel armor castings. Symington-Gould had earlier announced plans to sell its Rochester, N. Y., plant.

GE To Triple Jet Output

LEASE of a 700,000 sq ft war plant at Lockland, O., near Cincinnati, by General Electric Co., will enable the company's Lynn, Mass., jet aircraft engine plant to triple its output. The newly acquired facility will be used for assembly and testing of engines for the Air Force.

Delay in Patenting Explained

WHILE a prominent patent attorney is decrying the inability of the government Patent Office to handle the deluge of patent applications, another branch of the government, the Office of Technical Services, Department of Commerce, is offering for foreign patent filing 74 government-owned inventions in the fields of

chemicals, drugs, fuels, machinery, instruments, minerals, rubber and aviation.

Outstanding on OTS' list, available from John C. Green, director, is the recently developed magnetic clutch. Developed at the National Bureau of Standards, the clutch makes use of fluid and magnetic principles for power coupling and has a wide variety of potential mechanical applications. Also included on the list are developments in nickel recovery, electrodeposition of manganese and production of sponge iron.

H. A. Toulmin Jr., explaining that many war and postwar developments are being kept out of use because of Patent's inexperienced examiners and the increasing complexity of cases, cites as a further factor the increased rate of application receipts, now at an annual rate of 70,000 or almost double the 1943 rate.

Today, Mr. Toulmin says, 150,000 cases await action and examination is two years behind schedule.

Clue to Steel's Pricing?

HOW the steel producing industry may react to a possible Federal Trade Commission cease-and-desist order against its basing point pricing system can be read into the cement industry's current actions.

Cement companies, since the Supreme Court decision against their pricing methods, have made the obvious turn to f.o.b. mill pricing. But they aren't moving that way because they like to. The United States Steel Corp. subsidiary, Universal Atlas Cement Co., one of the 74 members of the industry told to cease-and-desist from July 9 on, will adopt, effective July 7, the method of selling at prices f.o.b. the shipping point, or, if the customer so desires, at delivered prices which reflect full transportation charges from shipping point to destination. In announcing its changed policy the company sent a few barbs FTC-ward.

Its pricing method, namely, sales in the markets served at delivered prices as low as those quoted by any competitor, has been in effect for more than 40 years, the company said, and to meet these prices it has "frequently been obliged . . . . to assume a part of the cost of transportation from its shipping point to the customer's destination." Furthermore—"Universal Atlas believes that the sales method hitherto used by it represents the fairest, most practical, and most nondiscriminatory way of marketing. . . ." Furthermore—"Although Universal Atlas holds firmly to its conviction that the order of the FTC is economically unsound and wrong, the law as interpreted by the Supreme Court of the United States must be respected and carried out, regardless of the grave difficulties which may thus be created for many buyers and users. . . ."

Building Cost Rise Seen

CUMULATIVE impact of basing point decisions, draft legislation and advancing wages and freight rates has set the stage for a further continuation of the upward trend in industrial building costs. This statement by George A. Bryant, president, Austin Co., Cleveland, was made as he reported a second-quarter increase of two points in the company's building cost index to 170 per cent of the 1926 average.

Although productivity of construction labor has been on the increase for more than a year, Mr. Bryant said, "these gains have been completely overshadowed by all the other cost factors." Mechanization of construction operations, which has materially aided in the increase in productivity, will have to be intensified, however, as the labor pool is depleted by the draft, he declared.

Suggesting that the draft administrators allow apprentices in the building trades to finish their training as college students will be allowed to complete their current academic year, he asserted that if this is not done the construction industries may permanently lose most of the skilled men recruited since V-J Day.

JET FIGHTERS: These F-80C Shooting Stars are assembled on the production flight line of Lockheed Aircraft Corp.'s jet testing base at Van Nuys, Calif. Recently ordered by the U. S. Air Force under the 70-group defense program, the F-80C is powered with an Allison turbo-jet engine and has a top speed of about 600 miles an hour. NEA photo

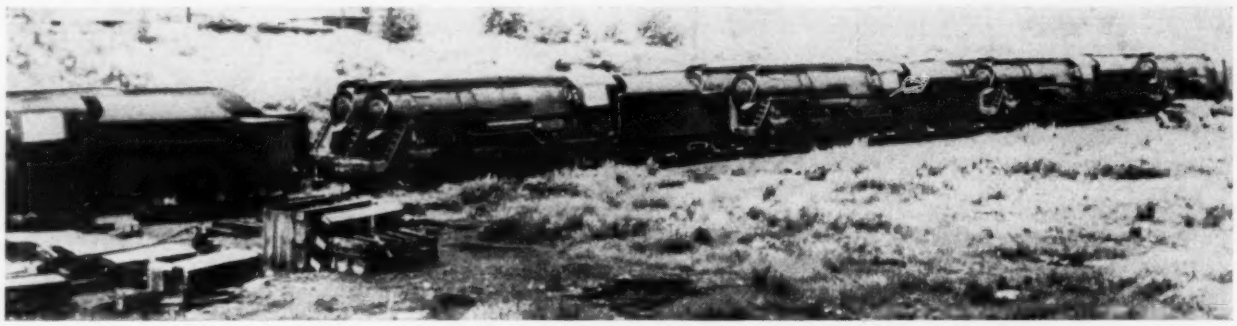
Tool, Die Strike Hurts Sales

MACHINERY sales are at a standstill in the Detroit area, the continuing strike of union workmen in virtually all the independent tool and die shops having dealt a crippling blow to equipment purchases. Mitigating the effect of the three-week strike on many of the smaller tool shops, however, is the fact that they were at low ebb on contract work.

Two of the smaller die shops have broken from the stand of the industry association and have granted wage increases beyond those offered generally. Opinion, however, is that they are now in the doghouse with both their competitors and with customers and will find the going rough once other plants resume operations.

Plans for a die shop at the Chrysler Highland Park plant have been limping along for six months and are still uncompleted.

Die program for Tucker Corp. has been fairly well completed, although there were 14 dies in one Detroit shop still unfinished at the time of the strike. Arrangements are understood to have been made to transfer the work elsewhere.



STALLED AT THE CROSSING: These locomotives, built for Turkey by Vulcan Iron Works, are rusting in rail yards at Wilkes-Barre, Pa., as the Turkish government shops around for cheap transportation to take them to Turkey. Forty-five units, some completed in January, are immobilized. NEA photo

New Freight Rate Increases Coming?

Traffic men expect another interim boost, possibly 5 per cent, within next few months. Settlement of wage dispute may decide how much and when increase will be granted

INDUSTRIAL traffic men are deep in speculation over the possibility of still another interim freight rate increase. Their thinking seems to revolve around an upward adjustment of 5 per cent, with many believing higher rates will be put in force this fall, and at least one brash enough to suggest that such an advance could come this month.

The crux of the rate problem at this point is the wage issue. And the government's attempts at settlement of the current dispute which still keeps the Army in technical operation of the nation's railroads are being spurred because of mounting dissatisfaction among train and yard crews. Recent White House conferences have been held with representatives of the roads, the unions and with Frank P. Douglass, chairman of the National Railway Mediation Board, aimed at settling the disagreement which probably would have resulted in a nation-wide rail strike had not the government stepped in.

Higher wages for trainmen at this time will immediately result in new petitions to the Interstate Commerce Commission for higher freight rates, in the opinion of the traffic men. Such petitions would be subject to study by the ICC and it seems doubtful any action taken on them would be put into effect yet this month.

Permanent Increase Delayed — The ICC, meanwhile, has not come up with a decision on the roads' request for a permanent 29.2 per cent average freight rate boost. It had been considered possible that ICC would take its action on this request before July 1 because of the wording of the second interim decision dated last December; this 17.5 per cent raise was effective through June 30. It was, however, superseded by the third interim raise of 21.4 per cent in April which will remain in effect "until further notice."

Because this latest increase brings the roads' rates to within 7.9 per cent of the full amount asked, the ICC is believed to be taking its time in writing the final decision to see how the roads fare under the present schedule.

This watchful waiting seems to be justified. Association of American Railroads in estimating May rail revenues indicates the Class I roads got $541 million from freight revenues compared with $480 million in May, 1947, a 12.6 per cent gain. Passenger revenues of 7.8 per cent less in May than in the like 1947 month, however, brought the overall revenue gain to 9.7 per cent.

Canadian Train Strike Looms

NOT ALL railroad wage troubles end at the Canadian border as 18 international railroad brotherhoods will be glad to tell you. They have set a strike date of July 15 if their dispute with the railroads is not settled by that time.

Smoother Going For Car Builders?

BUMPY roadbed over which the freight car building industry has been traveling shows some signs of smoothing out in spite of continuing materials shortages.

Harassing pressure on one spot in the industry was removed last week when the Justice Department asked that a Federal grand jury which was investigating possible antitrust violations among the car builders be dismissed. The request was granted by the District Court for the District of Columbia when the Justice Department said it had no intention of asking for an indictment. Justice began its investigation last December, following allegations that restrictive practices among car manufacturers had retarded production. Companies cited were American Car & Foundry Co., Bethlehem Steel Co., Greenville Steel Car Co., Pressed Steel Car Co., Pullman-Standard Car Mfg. Co., Ralston Car Co. and Magor Car Corp.

Improved assembly techniques also gave promise of greater speed on the production road ahead with ACF's announcement that welding, instead of riveting, operations at its Huntington, W. Va., plant have resulted in an output of 25 or more 70-ton coal hopper cars per day on an order for 6000 by Chesapeake & Ohio Railway.

Indications that there still may be rough stretches ahead, however, appeared in the announcement that some of the largest producers will have to close down partially in the next few months because of materials shortages. In the first quarter of 1948, car builders reversed a three-year trend by building more cars than were retired, for a net gain of 7910.

Rail Expansion To Top $2 Billion

ANTICIPATED increased competition from other forms of transportation as the result of rising rail freight rates, in addition to normal modernization needs, could be a contributing factor in the authorization or contemplation by 33 American railroads of

expenditures totaling $2 to $3 billion for improvements of plants and equipment.

These figures were revealed in a report, "Railway Preparedness," based on a survey by P. Harvey Middleton, president of Railway Business Association, in co-operation with heads of 33 Class I railways operating 76 per cent of the mileage in the country. United States railways, the report discloses, now have on order well over $1 billion worth of new equipment. As of May 1, 1948, railways had on order 135,176 new freight cars and 1572 new locomotives, including 117 steam and 1455 diesel. In the first four months of this year, 31,704 new freight cars and 411 new locomotives (including 5 steam, 4 electric and 402 diesels) were put in service.

Concentrating Taconite

Shipments to start this month from Erie Mining Co.'s new pilot plant in Minnesota

A NEW MILESTONE in the search for an economical and practical substitute for the diminishing reserves of direct-shipping iron ore is being approached.

After years of study and considerable money expenditures, Erie Mining Co. will this month start operating its new pilot plant for further perfection of taconite concentration methods.

Located at Aurora, Minn., on the Mesabi Range, the pilot plant will take the experiments out of the confines of the laboratory and put them on a basis more comparable with full-scale, production-plant operations. This will help determine whether a large commercial plant should be built, and, if so, how it should be equipped.

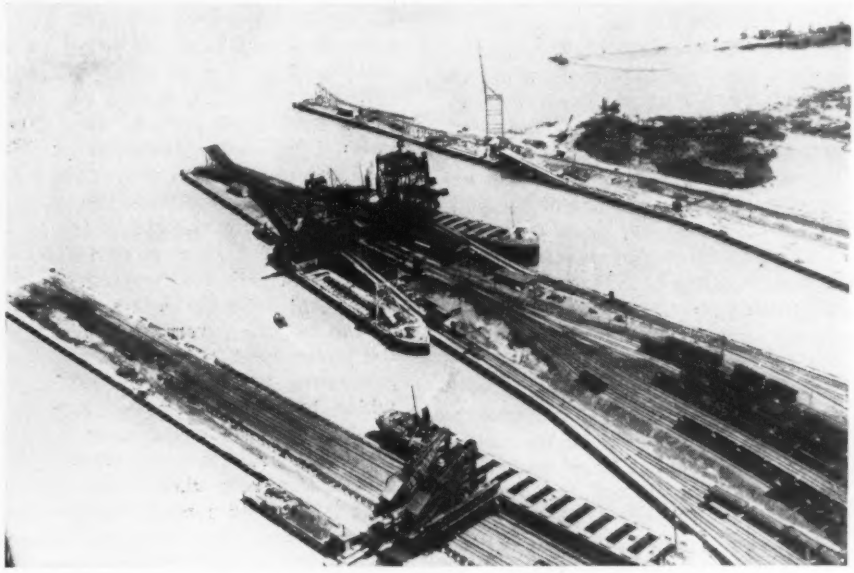
Resembles Commercial Plant—The pilot plant's equipment is in general the same size and character as contemplated for a full-size commercial taconite concentration plant, with the exception that primary crushers will not be used. Roughly, the process comprises haulage of the crude taconite material by truck to the crushing plant after drilling and blasting. The plant involves three-stage crushing, grinding equipment consisting of rod mills and ball mills, classifiers, magnetic separators, filtering plant, mixing plant and facilities for agglomerating the finely ground product.

The raw material to be treated will be the unaltered iron formation containing approximately 30 per cent iron, which will be mined by open pit methods.

The pilot plant is designed to treat approximately 1800 long tons of material per 24-hour day, which will involve an annual production of finished concentrate of around 175,000 to 200,000 tons per year if the plant is operated continuously, and the mining of up to 600,000 tons of crude taconite a year. After concentration the product will be approximately 65 per cent iron.

Not for Sale—None of the taconite from this pilot plant will be for sale on the open market but will go to two or three steel companies, including Bethlehem Steel Co. and Youngstown Sheet & Tube Co., which are financially associated in Erie Mining Co., a subsidiary of Pickands Mather & Co., Cleveland. The steel companies will utilize the pilot plant's output to adapt blast furnace and open hearth practices to use of the concentrates.

Meanwhile, a number of other companies are also pressing research on the technical and economic problems of concentrating the abundant iron-bearing rock (taconite) of the Lake Superior district.



ENHANCES TOLEDO'S IMPORTANCE AS ORE, COAL TERMINAL

Toledo Ore Dock Busy

TOLEDO'S new $18.5 million coal and ore dock, a joint facility of the Baltimore & Ohio and the New York Central railroads, will be completed before the end of the 1948 shipping season. The dock already is in operation and more than 2 million tons of coal have been dumped at the new facility this year.

When completed the dock will have three coal-dumping machines, each capable of unloading the contents of 70-ton coal hopper cars into the holds of lake vessels at the rate of a car a minute, and two unloading machines capable of taking ore out of vessels at the rate of 30 tons a minute. Annual handling capacity will be 20 million tons of coal from mines in Ohio, Virginia, West Virginia, Kentucky and Tennessee and 4.5 million tons of ore from the upper lakes for shipment to inland steel plants.

Photo, below, shows the three piers, that in foreground contains the ore unloaders; center pier has two coal dumpers; third coal dumper is being erected at pier in background.

Wolcott Goes to Germany

Robert W. Wolcott has been sent to Europe by the Commerce Department's Office of Industry Cooperation to join Alfred Hirsch, OIC representative in Frankfurt, to expedite shipments of German steel scrap to the United States. Latest advice from General Clay, commandant in the United States occupied zone, is that a total of 600,000 tons of scrap have been allocated for shipment from Germany over the remainder of this year; of this total 240,000 tons each are to go to the United States and Great Britain and the remainder to France and other countries. Mr. Hirsch and Mr. Wolcott are to attempt to encourage the Germans, through the use of incentives, to push scrap collections to the end that a larger tonnage may be shipped to the United States. Mr. Wolcott, president, Lukens Steel Co., is chairman of the Steel, Foundry & Scrap Industries Committee for Expediting Scrap.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

"Liberals" who plugged for 105-million-ton steel capacity and government ownership of mines nearly scored victory on another front against private enterprise

NOW that Congress has gone home and eyes can be taken off the legislative halls observers are free to follow the often heard advice of the politician to "look at the record."

This review of the record is not as dull as it might appear at first glance, for here and there some interesting and unusual stories crop out. One of the more choice ones is an action of the 80th Congress to guard private enterprise against the encroachment of government competition.

The administration wanted to build a multi-million-dollar steam power generating plant at New Johnsonville, Tenn., and pointed up its recommendations with a special message from President Truman. This plant, estimated to cost from $54 million to $84 million, depending on the nature of the final layout, was needed, so said the administration, to "firm up" the hydroelectric power supply of the Tennessee Valley Authority.

But the Republican Congress, with the help of many Democrats, threw it out on the basis that it would have been an improper invasion of the private business field.

Delving further into this story, it is found the sponsors of the project were the so-called "liberals," the same general group that has been plumping for government ownership of coal mines, the group which Sen. James E. Murray (Dem., Mont.) represented on numerous occasions when he advocated expansion with public money of steel capacity to 105 million ingot tons.

Taxpayers Groups On Guard—Twenty affiliated state taxpayers associations opposed the New Johnsonville steam plant project on the ground that taxpayers all over the country are forced to carry an unjust load for the benefit of those portions of the population benefited by public power. But the opposition which apparently scored most heavily was that of Purcell L. Smith, president of the National Association of Electric Companies, who claimed that the steam plant issue was one to be decided squarely on the basis of philosophy of government. Construction of the steam plant, he held, would not only pave the way for construction of other government-owned steam generating plants, but would encourage the government to embark "in any and all other businesses in competition with private citizens."

The decisions of the 80th Congress in regard to public power gave some sort of a preview of the sort of public power law that is expected to be laid down by the 81st Congress if legislators favorable to private enterprise again are in the majority after the elections this fall.

The prevailing concept in the 80th Congress was that river development —as flood control and irrigation dams—is distinctly a responsibility of the federal government, and that the government belongs in the power generating business to the extent to which hydroelectric power is a by-product of river development.

Several projects were thrown out by the Congress when it was shown that they would compete against private utilities. For example, authorization of the Harve-Shelby transmission line from Fort Peck was cancelled when it was shown that this proposed public line would duplicate adequate privately-owned facilities. In another bill it was proposed that power development at the proposed Clark Hill flood control project in Georgia be left to private interests.

Because of "pork" considerations that usually influence many votes on public power legislation, the enactment of a public power bill to safeguard the future of the private power industry will not be an easy task. Pressure for an increasing place for the government in the power field is strong. As a matter of fact, elimination of the New Johnsonville steam plant project squeaked through by the narrowest of margins. Whereas the Senate favored the project by a vote of 47 to 37, the House threw it out by the close vote of 201 to 186 —and then managed to win out in conference with senators who had to throw in the sponge on this issue to get an appropriation bill.

Would Increase German Steel

AMERICAN "know-how" is being utilized in an attempt to increase Germany's Bizonal steel production in the interests of general European recovery.

In Germany studying the problem are a group of American steel experts headed by George W. Wolf, president of the United States Steel Export Co., subsidiary of United States Steel Corp. Accompanying the mission are Clarence B. Randall, Inland Steel Co. vice president who now is a representative of the Economic Cooperation Administration, and Roy Bullock representing the Joint Congressional Committee on Foreign Economic Cooperation.

The mission was set up by the Army after consultation with Paul G. Hoffman, Economic Cooperation Administrator, Charles S. Dewey, director of the Joint Congressional Committee on Foreign Economic Cooperation, and several of the leaders of the United States steel industry, including Walter S. Tower, president of the American Iron & Steel Institute. All fully approved the basic purpose of increasing the present low level of German steel production in the interests of general European recovery and of eventually reducing the impact of European steel requirements on the United States steel industry.

According to the revised level of industry plan, steel production in the Bizonal area is limited to approximately ten million tons annually. However, production currently is at an annual rate of only four million tons annually.

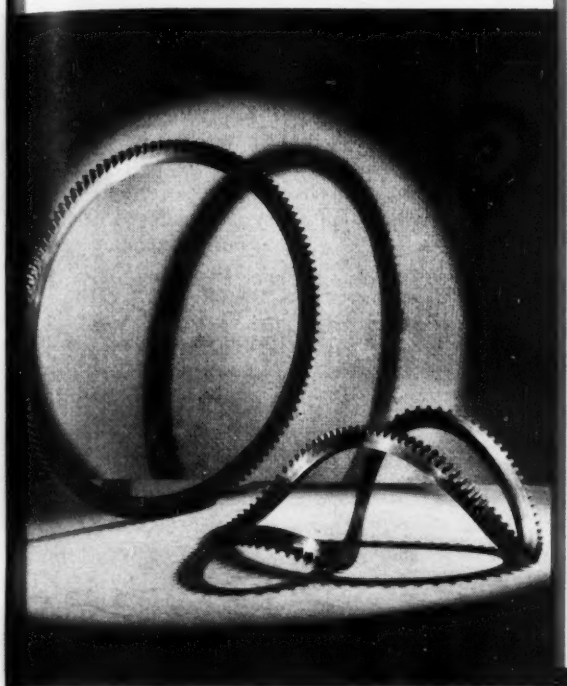
Steel and Machinery Sought

ESTIMATES of October-December needs of participating nations under the Marshall Plan now are being received from Paris by the Economic Cooperation Administration and, for the first time, requests for steel and machinery are in substantial volume. ECA, with Commerce Department assistance, will screen them and authorize such items as appear to meet the two requirements: 1—They must contribute to rehabilitation of the western European economy, and 2—they must be exportable without injury to the United States economy.

Manufacturers and exporters interested in benefiting from the Marshall Plan's operation can obtain from the Economic Cooperation Administration, Washington 25, D. C., a copy of ECA Regulation No. 1. This describes how a seller of goods under the Marshall Plan gets payment, and sets forth the forms which have to be filled out.

In general, the ECA does no buy-

flamatic-hardened at the rate of 125/hour



That's a lot of ring gears: 125 per hour – Flamatic surface hardened to predetermined hardness patterns – to maximum surface hardness – and with cores still tough, as dramatically demonstrated in the photograph at the left. These two gears, of C-1050 forging bar quality fine grain steel, came off the line at Automotive Gear Works, Richmond, Indiana, both Flamatic-hardened in the 55 to 60 Rc hardness range, one pretzel-twisted by four men and two crowbars to prove core toughness.

With Flamatic-hardening, rapid heating puts heat where you want it. Electronic temperature control (only Flamatic has it) assures hour-after-hour uniformity yet to be equalled by any other surface hardening technique! First cost of Flamatic is remarkably low considering its speed and work size range: gears up to 16" O. D. depending on width, spindles up to 18" long depending on O. D. Check Flamatic now as applied to your surface hardening requirements. **Write for complete, interesting Bulletin No. M-1611.**

Photo above shows two 12" flywheel ring gears, 10-12 pitch, ½" wide, after Flamatic hardening. One is twisted into a figure eight to show core toughness, combined with surface hardness in a range of 55 to 60 Rc. Magnaflux showed no fractures visible. Photo at the right shows Flamatic-hardening machine in production at Automotive Gear Works, Inc., Richmond, Indiana.

THE CINCINNATI

flamatic

HARDENING MACHINE

PATENTS PENDING

CINCINNATI

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO, U.S.A.

ing itself and merely audits invoices to determine whether orders have been placed and accepted by American suppliers with three factors in mind: Quality, price and availability. ECA does not exert any influence as to who is to get orders, and leaves the foreign countries free to buy where they choose. ECA, however, is trying to persuade the participating countries to follow the United States example, namely, by handling their purchases through private firms rather than through government missions.

ERP Seen Founded on Steel

KEYSTONE of European economic recovery and resurgence of democracy is steel. America's necessary contribution of steel, either directly or in the form of steel mills, machines and machine tools, to bring about this dual aim is estimated by Rep. Christian A. Herter at $190 million worth.

The vice chairman of the House Select Committee on Foreign Aid predicts domestic steel shortages will not be relieved until the facilities to be provided the countries participating in the European Recovery Program go into operation.

When ERP is successfully completed, Representative Herter advises that Europe, instead of having one continuous rolling mill as it did at the beginning of the war, will have continuous sheet and strip mills in France, Holland, Belgium, Luxemburg, Austria and probably in England.

Upsurge in steel production in non-European countries has been instrumental in raising standards of living and would do much in the European countries to provide their people with better living conditions, he asserted.

To Seek Strategic Materials

FORMATION of a Strategic Materials Division and appointment of a director has been announced by the Economic Cooperation Administration.

The division is to facilitate production and procurement of materials needed by the United States, and is to be headed by Evan Just, who has been editor of *Engineering & Mining Journal,* New York, for the last six years. Mr. Just, who is a geologist and engineer, is now on leave from the editorship to assume his new duties.

Signs Stockpiling Measure

TWO-THIRDS of the $600 million expenditure which the Second Deficiency Appropriation bill authorizes for stockpiling of strategic and critical materials is expected to go for minerals and metals. The bill was signed last week by President Truman.

Names Draft Advisory Board

DEFENSE Secretary James Forrestal has appointed an ad hoc committee to advise him on manpower and other problems connected with the Selective Service Act recently signed by President Truman. Group will be headed by John Noble of the legal staff of the defense secretary who was a liaison man between the houses in drafting the legislation. Its membership includes two representatives from each of the three military departments.

KENNETH ROYALL

Secretary of the Army, explains the new draft. Labor supply will probably be affected only moderately by the 30,000 to be inducted monthly, to total about 250,000 by June 30, 1949

Army: Maj. Gen. John E. Dahlquist, deputy director, personnel and administration division, Army General Staff; Col. Edward M. Starr, chief of training group, organization and training division, Army General Staff.

Navy: Rear Adm. Thomas L. Sprague, chief of Naval personnel; Capt. Thomas F. Darden, assistant chief of Naval personnel.

Air Force: Maj. Gen. Bryant L. Boatner, assistant deputy chief of staff, personnel and administration; Maj. Gen. Richard E. Nugent, director of civilian personnel, personnel and administration.

Extends Trade Agreements

RUMORS of another Presidential veto proved groundless when President Truman, on June 26, signed the one-year extension of the Reciprocal Trade Agreements Act which Congress voted in lieu of the usual three-year continuation. In his accompanying statement he expressed regret over the short extension "which," he said, "appears to cast some doubt upon our intentions for the future." The President also criticized what he called "a new, complicated, time-consuming and unnecessary procedure" for the negotiation of reciprocal trade agreements.

He had reference to the act's provision for participation of the Tariff Commission in tariff agreement negotiations. The President must notify the Tariff Commission whenever he plans to negotiate a tariff agreement, and the commission must hold hearings on every item under discussion. The commission then must recommend "peril points" below which tariffs should not be cut—in the commission's judgment—for the protection of United States industries. The commission must make its report within four months after receiving notification from the President. The President may disregard the commission's recommendations but when so doing he must report his reasons to Congress within 30 days.

The present act is merely a stopgap measure and the need for legislation again will come up in the 81st Congress to set a long-range policy. A point to be decided next year is whether Congress should retain power to veto Presidential tariff cuts. The bill just signed does not give Congress that power; the House favored such a provision but the Senate struck it out and House conferees acceded.

Export Procedure Modified

AUTOMOTIVE products, farm and industrial machinery and consumers' durable goods are among the products affected by a new Commerce ruling which permits a validity period of six months for export licenses to ship these commodities to European destinations. These licenses were formerly good for only 90 days. No change has been made in the regulation which permits the shipment of certain specified commodities to European destinations without validated licenses.

New Atomic Laboratory

A NEW chemical laboratory to provide precise analytical quality control of special materials used in the national atomic energy program will be established at New Brunswick, N. J.

The laboratory will occupy a one-story manufacturing plant originally built by the Navy during World War II to manufacture naval pumps. After the war the building was purchased by the McBee Co., Athens, O.

India Launches Roller

"Made in India" sign on steam roller proclaims new era in industrialization

JAMSHEDPUR, INDIA

INDIA'S metalworking factories have begun production of a product which is completely new to the country's economy—steam road rollers. When the first one to be built, the "City of Delhi," took to the road here from the works of Tata Locomotive & Engineering Co. Ltd., it was launched much as a ship would be before jubilant crowds and with the Indian minister for industry and supply, Dr. S. P. Mookerjee, christening it.

Introduction of the Indian-made road roller is regarded as an important milestone in the country's industrialization. Because its manufacture is the result of co-operative action between several Indian ordnance plants, the Tata enterprise, and Marshalls, an important English road roller builder, Dr. Mookerjee said the successful completion of the machine represents an answer to the problem of how far foreign capital can be used in the country's development.

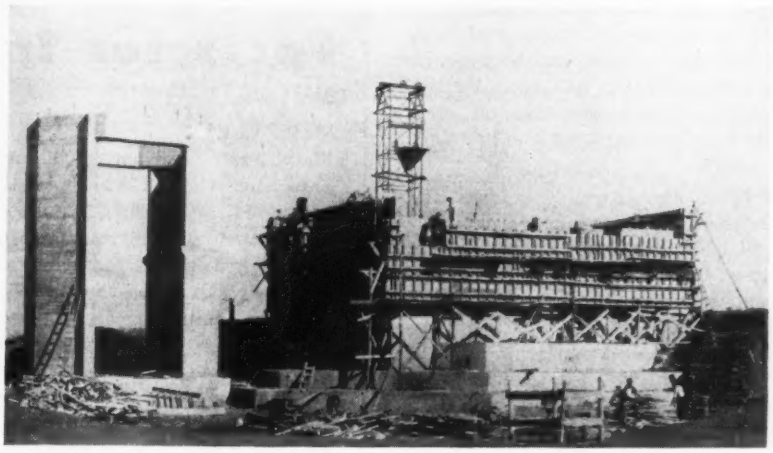
Tata Locomotive & Engineering Co. was formed in 1945 to operate a railroad shop which dated back to World War I. The factory is currently being expanded to produce 100 boilers and 50 locomotives a year. Its goal for rollers is one a day.

The first road roller is part of an 1000-unit order from the Indian government but Tata expects to continue production after this contract is completed. To enable the firm to make most of the components for the rollers, it is planning to build mechanized foundries on the expanded site for production of nonferrous and ferrous castings and also to install necessary machine tools and forge equipment.

Special Steels Protected

PROTECTION for India's alloy, tool and special steels industry against foreign importations will be given through higher tariff duties. Acting on the advice of the Tariff Board which considered the industry's request, the Indian government will put into effect a 30 per cent ad valorem duty on special steels of British or other foreign manufacture.

Although this specific duty would be in effect only until Mar. 31, 1949, the government has assured the industry of protection until Mar. 31, 1950.



CHILEAN BLAST FURNACE: Chile's first integrated steel plant is beginning to loom against the horizon, as witness these foundations for the blast furnace. When finished, the plant will include coke ovens, a blast furnace, open hearth furnaces, a bessemer converter and finishing mills. The facility is being built at Concepcion for Pacific Steel Co. of Chile by Koppers Co. Inc., Pittsburgh

In accord with the industry's request the government also accepted as estimated fair sales prices the following: For 3.5 per cent nickel steel $237.36 a ton; for 18 per cent tungsten high speed steel $1.36 per lb; for 5 per cent cobalt steel $1.61 per lb; and for stainless steels $.46 per lb.

Germans Decry Ruhr Verdict

DUSSELDORF, GERMANY

GERMANY'S steel production capacity is still the football in a game of international politics. Kicked around by country after country since the close of the war, the industry now is to be subject to international control under which, it is feared, fair and impartial operation will be impossible.

The London decision to internationalize the Ruhr was met here with gloom. The Germans feel that in times of general shortage, as at present, a maximum of German coal and steel will be shipped into western Europe, thus jeopardizing revival of German manufacturing; when world competition returns, the coalition controlling the Ruhr will restrict the section's exports. In both cases the Ruhr would be treated as a buffer economy in the business cycle, cushioning western Europe against shortages of materials in boom times and sales competition in depressions.

Decision of the authority would be supreme, even against possible interference from the administrator of the European Recovery Program and the military governor of the U. S. zone, both of whom have a constructive interest in German business revival.

Controlled "Freedom" — Another depressing development in German affairs is the currency reform, which, while instituting a nearly free domestic market and price system in Germany, prevents free trade outside the country's borders. The reform, Germans believe, will succeed only if export outlets are freely given to make up for reduced domestic purchasing power.

The effect of the currency reform on the appearance of shops was little short of miraculous and was gratifying to all, notwithstanding the desires of many business men to have foreign markets opened to them. Overnight, stores were filled with

GALLIC HOPES FADE

The Parisian press, speculating as to probable American foreign policy if Thomas E. Dewey is elected President, generally believes the present program of aid-to-Europe and co-operation with it will be continued. One fear which is prevalent in their reaction to his nomination, however, is that an industrial Germany will again be built up. Unanimous in their opinion that John Foster Dulles would be Dewey's secretary of state, the papers think there is no hope left for a change in American attitude toward German reconstruction.

merchandise which was formerly available only in the black market.

One of the most puzzling problems is how to pay wages, and because of this, new attention has been turned on cutting costs, weeding out the least productive workers and liquidating stocks.

In brief, the currency reform has given the German economy a lesson in efficiency, willingness to work and produce; but as a supplement to these corrections, industry now needs a new supply of capital and equipment to rebuild its productive machinery, and a better supply of raw materials.

Canadian Steel Output Off

CANADIAN iron and steel production showed a trend to level off in April with the daily average for pig iron up 1.7 per cent over March and steel output off 4.3 per cent. The April pig iron output at 170,785 net tons indicated an average rate of 75.7 per cent against 74 per cent in March. At the end of April, 12 of the 14 blast furnaces in Canada were blowing.

Production of steel ingots and castings in April also slipped, with output amounting to 264,266 net tons, or 90.6 per cent of rated capacity; these figures compared with 286,026 tons for March, the all-time record, or 94.19 per cent of capacity.

Following are comparative production figures in net tons:

	Steel Ingots Castings	Pig Iron	Ferro-Alloys
April, 1948	264,266	170,785	14,474
March, 1948	286,026	172,675	14,293
April, 1947	252,156	160,749	13,015
4 Months, 1948 ...	1,046,664	654,625	57,715
4 Months, 1947 ...	1,000,908	653,097	46,213
4 Months, 1946 ...	975,152	587,032	43,283

Meetings . . .

July 16-24, American Road Builders' Association: 1948 convention and road show, Soldier Field, Chicago. Association headquarters are in the International Bldg., Washington.

July 21-23, American Society of Civil Engineers: Summer convention, Olympic Hotel, Seattle.

July 26-27, Institute of Scrap Iron & Steel Inc.: Midyear meeting, Ambassador Hotel, Atlantic City, N. J. Institute executive vice president is E. C. Barringer, Dupont Circle Bldg., Washington.

Aug. 10-13, First Western Packaging Exposition and Conference: San Francisco Civic Auditorium, San Francisco.

Aug. 24-27, American Institute of Electrical Engineers: Pacific general meeting, Spokane, Wash. Institute headquarters are at 33 W. 39th St., New York.

Sept. 7-20, Department of State: First inter-American conference on conservation of renewable natural resources, Denver.

Sept. 13-17, Instrument Society of America: Third instrument conference and exhibit, Convention Hall, Philadelphia. Society headquarters are at 1117 Wolfendale St., Pittsburgh.

Sept. 20-25, American Mining Congress: Metal mining convention, San Francisco.

Facts for Industry . . .

Metal Cans

Metal can shipments in April amounted to 208,587 short tons, compared with 207,726 tons in March and 204,666 tons in April, 1947. Shipments of food cans were up 6 per cent over the March total, but nonfood can shipments were off 11 per cent. Shipments of cans to the trade amounted to 164,636 tons of steel, representing 79 per cent of total shipments. *Census Bureau, Commerce Dept.*

Warm Air Furnaces

Factory shipments of warm air furnaces increased from 39,297 units in March to 45,600 units in April and were valued at $7.8 million. Furnaces for solid fuel combustion represented 51 per cent of the total, gas-fired for 27 per cent and oil-fired for 22 per cent. About 75 per cent of the furnaces were of steel and the remainder of cast iron. Inventory at the end of April was 107,768 units, 16 per cent higher than stocks on Mar. 31. *Census Bureau, Commerce Dept.*

Aircraft and Engines

Airframe weight of the complete aircraft shipped was relatively stable between March and April, 2,033,900 lb having been shipped in April and 2,069,000 lb in March. Domestic military services took delivery on 58 per cent of the April total; personal-type civil aircraft accounted for 27 per cent and transport-type civil aircraft for 15 per cent. Of the 937 planes shipped in the month 772 were for civil use, these being valued at $8.5 million, 10 per cent greater than in the previous month. Value of aircraft engines and parts shipped in April was $30.8 million, 2 per cent higher than in the previous month. Of the total, military engines and parts accounted for $25.6 million or 83 per cent. *Census Bureau, Commerce Dept.*

Oil Burners

Oil burner shipments increased for the first time this year in April and at 22,139 units were 18 per cent above March factory shipments. They were, however, only about one-fifth of shipments in April, 1947. Of the total, residential type burners and burner units accounted for 20,193 units, or 91 per cent, while 1,946 units were commercial and industrial burners and boiler-burner units. *Census Bureau, Commerce Dept.*

Heating Stoves

Production of domestic heating stoves amounted to 367,318 units in April, a slight decrease from March output of 369,656 units. Shipments, however, showed an increase in April, amounting to 280,031 units, valued at $5.7 million, compared with March shipments of 267,649 units and $6.0 million. Inventories at the end of April increased to 550,822 units and unfilled orders rose 172,000 units. *Census Bureau, Commerce Dept.*

Canning, Packaging Closures

Three per cent fewer commercial metal and plastic caps were turned out in April than in March, total production having been 980 million. Of the total 786 million were metal caps. Output of milk bottle closures dropped to 1,506 million from 1,673 million in March. April production of crowns was 29.4 million gross, 10 per cent below the March total. Output of metal screw bands rose to 464,000 gross from 424,000 gross in March and metal lid production increased to 1,348,000 gross from 1,315,000 gross in March. Consumption of tin mill products for metal closures amounted to 573,000 base boxes in April compared with 588,000 base boxes in March. *Census Bureau, Commerce Dept.*

Crude Petroleum

April average daily runs of crude to stills at 5,540,000 bbl were 153,000 bbl over March and 833,000 bbl over April, 1947. Daily average imports of foreign crude were 325,000 bbl, 45,000 bbl above the March average and 83,000 bbl a day higher than in the like month a year ago. Crude oil stocks at refineries increased 1,838,000 bbl during the month and were 1,197,000 bbl higher than in April, 1947. *Bureau of Mines, Interior Dept.*

Western Round-Up

Glowing steel production figures and ambitious expansions augur well for future

GLOWING production figures and ambitious expansion plans indicate that the western steel industry is no mere burnt-out sprinter, but is capable of running an excellent long-distance production race, eventually satisfying to that harassed spectator, the western metalworking executive.

Geneva Steel Co., U. S. Steel Corp.'s Utah subsidiary, currently is producing 100,000 tons of steel ingot monthly. All its three blast furnaces and four batteries of coke ovens are operating, while eight of the nine open hearths are in production. The plate mill is on three turns a day, and the structural mill operates on a two-shift-per-day basis. Last month Geneva completed its second year as a subsidiary of U. S. Steel. In that time its production of 1,355,859 tons of pig iron and 1,579,419 net tons of steel ingots far exceeded the most optimistic predictions made in 1946, according to Dr. Walther Mathesius, Geneva's president.

$20 Million Expansion Program— Geneva has in progress the first step of a $20 million conversion and improvement program. The plate mill is being converted to production of hot-rolled coils, work which is nearly a third finished. The coils will be used to supply the new cold-reduction mill at Pittsburg, Calif., of Columbia Steel Co., another U. S. Steel subsidiary. Eventually the material also will be used in the new cold-reduction mill planned by Columbia for erection at Torrance, Calif. Columbia's new Pittsburg mill, which will have a capacity of 400,000 tons of sheets and tinplate annually, is in its first test run stage. The plant is expected to be completed and in full operation by next October or November.

Kaiser Co.'s Fontana, Calif., plant, second only to the Geneva unit as a western producer, also has been chalking up new production records, with a new high of 80,103 net tons of ingots turned out in May. Previous monthly record was 77,578 tons. At the same time, shipments of finished mill products also achieved a new monthly high at 61,184 tons in May, compared with 53,519 tons last December, the previous best month. Kaiser will expand the Fontana plant at a cost of $18,500,000, funds for which were authorized by the Reconstruction Finance Corp. Program calls for installation of facilities to produce 100,000 tons of hot-rolled sheets, up to 78 in. wide, annually. A new electric weld pipe plant will have annual capacity of 100,000 tons of pipes from 5 to 14 in. in diameter. A 144,000-ton capacity open hearth, to cost $3.5 million, also will be constructed.

Light Metal Users See Shortages

ALTHOUGH steel users on the Pacific Coast can look forward to better supplies, light metal consumers face gloomy prospects, at least until 1952, because of power shortages.

Paul J. Raver, Bonneville power administrator, reports that light metal plants in the Northwest area, particularly aluminum facilities, cannot expect an increase in power regardless of favorable conditions until about four years from now.

Aluminum production will be 550 million pounds below demand this year and by 1952 the shortage is expected to total a billion pounds. Bonneville is now selling about 45 per cent of its energy to aluminum plants.

Troutdale Pot Line Opens

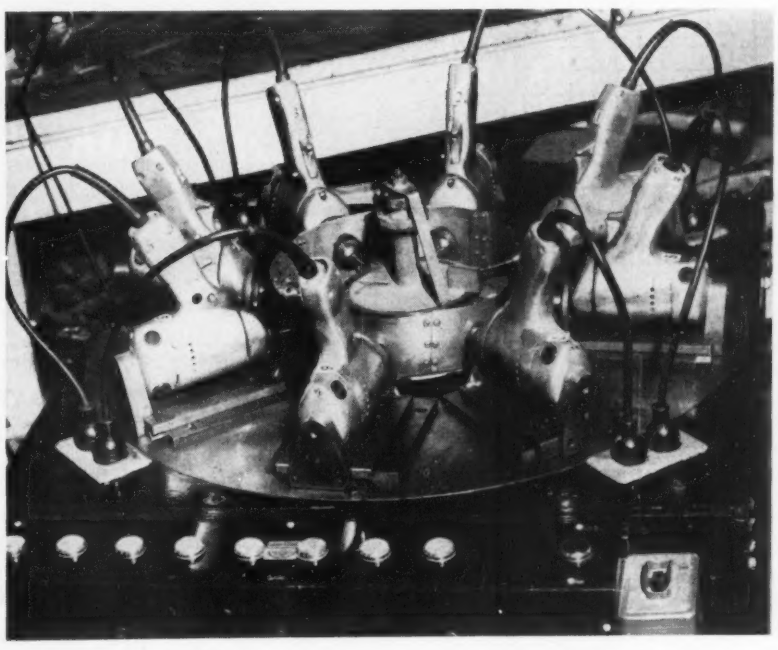
ALUMINUM production will resume at Reynolds Metals Co.'s Troutdale, Oreg., plant this week as the company opens its first pot line since the flood threat of early June. The plant was closed down on the advice of Army engineers when protecting dikes were threatened by the flood.

The plant has four pot lines with estimated annual capacity of 144 million pounds of aluminum. By the end of July all lines are expected to be in operation.

CAA Airport Program Proceeds

FIFTY-SEVEN grant offers totaling $7,214,988 in Federal funds were made by the Civil Aeronautics Administration to local airport sponsors during the period between May 15 and June 15 under the Federal Aid Airport Program. This brings the total number of grant offers made to 329.

The largest grant to date in the entire program was made during the period to Chicago, in the sum of $2,600,000, exceeding that of $1,222,500 to Broome county, Binghamton, N. Y., earlier in the program. The funds for Chicago are for the improvement of the Chicago Orchard Airport. Smaller airports, however, account for 284 out of the grants made.



96 HOLES IN 48 SECONDS: That is the production record of this electronically controlled machine developed to drill burner holes in a mushroom type hot water heater burner manufactured by Continental Water Heater Co., Los Angeles. Machine's eight motors index 12 times each in every operation. Light for each motor indicates completion of cycle. Two other electronic devices turn on lights and stop the machine to indicate broken and dull drills which slow down the operation. Production is said to be 500 burners a day by one man

HY-LOAD is an outstanding member of the Hyatt Roller Bearing family. Takes on tough loads without a murmur—rough service doesn't bother it a bit.

Universally useful because HY-LOAD is made in ten types and a wide range of sizes. A high quality roller bearing for high capacity work. Separate parts are completely interchangeable; adhering to AFBMA dimensions.

HY-LOADS, for years, have demonstrated their quality and trouble-free performance in many fields—mills and factories—on farms—oil fields—railways—highways and skyways. May we help you? Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

More than 2,600,000 vehicles produced in first half despite sporadic shutdowns caused by materials shortages. New General Motors models expected around Nov. 15

DETROIT

GATHERING steam for a second-half production push, the motor industry can look back with a degree of satisfaction on assembly of better than 2,600,000 vehicles in the first six months of the year, despite sporadic interruptions to operations occasioned by materials shortages. The one-week shutdown of all General Motors plants now is pretty well washed up, except perhaps for West Coast units, and the various divisions should resume their pace of about 43,000 units per week, broken down as follows—Chevrolet 25,000 cars and trucks, Buick 5500, Pontiac 5000, Olds 4500, Cadillac 1500 and GM truck 2000. Depleted inventories forced Packard and Hudson to make last-minute decisions to suspend production for several days over the Fourth of July week-end, closing for three days. Loss of approximately 5000 units is indicated.

Fisher Body has issued its final 1948 model parts orders and first releases on them are scheduled for shipment Aug. 2. The allotment covers production for roughly two months, indicating shipments will be cleaned up around the end of September. Manufacturing, of course, will carry forward another 4-6 weeks, inferring a model changeover around Nov. 15. First orders to cover 1949 models are expected momentarily by suppliers. That is the picture right now; unanticipated interruptions in the next three months will result either in the schedule being stretched out further into November, or it might be chopped off to meet the planned changeover date. Governing factor probably will be how quickly new components can be brought into production this fall.

Top GM officials from New York and Detroit assembled recently at the General Motors Proving Ground near Milford, Mich., for an unpublicized meeting, presumably to inspect the pilot models of the upcoming Buick-Olds-Pontiac-Chevrolet 1949 series.

Ford Steps Up Output

Ford is gradually accelerating the pace of passenger car production, although many unfortunate holes have developed in parts banks. In one case, for example, it was necessary to rush through an emergency shipment of several hundred thousand small pieces, by costly air freight incidentally, to avoid pulling the switch on assembly lines. At first glance this might appear to be poor planning by purchasing and follow-up but it must be remembered the Ford organization is still in process of being shaken down to an efficient, integrated team and there are bound to be occasional lapses. A goal of 5000 passenger cars daily has been set, although it is some distance away. Currently, output is in the range of 1600-1800 daily, or about half of what Chevrolet is building.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1948	1947
January	422,324	366,205
February	399,460	393,636
March	519,126	443,588
April	462,295	445,137
May	359,987	404,191
June	460,615*	421,466
6 mos.	2,623,807	2,474,223
July		400,944
August		364,478
September		444,501
October		461,536
November		417,493
December		492,109
12 mos.		5,055,284

* Preliminary.

Estimates for week ended:

	1948	1947
June 12	109,831	97,943
June 19	109,259	102,545
June 26	94,054	103,203
July 3	112,000	63,460

Estimates by Ward's Automotive Reports

Chrysler Makes 25,000 Weekly

Chrysler is driving to new high assembly totals, having now returned to the level of last December, around 25,000 weekly in all divisions; Plymouth is nearing 10,000 per week, Dodge 10,000, including 3500 trucks, DeSoto 2500 and Chrysler 3000. Here again the pressure is on for further boosts to these totals but it is touch-and-go whether parts and supplies can be kept moving in at a rate much better than the present.

Hudson To Offer Convertible

Hudson is skimming along at 3500 per week, with its step-down model now rolling off lines in both 4-door and 2-door versions and a convertible to appear shortly. Officials there are still grumbling over the steel situation and feel they have been badly treated by the larger mills. June production of more than 15,000 cars, or 50 per cent better than the same month a year ago, was possible only because of extreme steps the company has taken to reinforce its steel supply—scrap-ingot-sheet conversion arrangements and the purchase of the Shenango Rolling Mill in Pennsylvania. It is understood Rotary Electric Steel in Detroit is a principal source for sheet bar to be rolled at the Pennsylvania plant.

Packard Production Doubled

Packard, likewise, is hitting new highs in assembly rate, doubling the pace of last year at this time and holding far in advance of the 1941 record. Weekly totals are running to 2200 or more and schedules are slated to be pushed ahead this month. It is quite likely July will see better than 10,000 units built and by year-end the books may show a new 12-month production achievement. Best year for Packard was in 1937 when assembly count ran to 109,518. No early changes are seen in the basic Packard design, although there could be eventual embellishments to differentiate 1949 models. Incidence of an automatic transmission is not seen before next year.

Nash To Change Models

Nash likely will run out its 1948 schedules this month and suspend for most of August for a model change. Production should resume at nearly full tilt after Labor Day. Weekly assemblies at present average around 2800, far from plant capacity but still considerably above its turnout rate a year ago at this time. Speculation over what Nash will offer in new jobs centers around increased room

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FROM FRANCE: Comprising the first shipment of French automobiles to the United States since the war are 70 new Renault cars, some of which are shown here aboard ship upon arrival recently at New York. NEA photo

in bodies, with particular consideration being given to taller persons, and, of course, some form of automatic transmission which Nash engineers have had under test for many months. It is not known whether a decision has been reached as yet on exactly what type of transmission unit to feature, since tests have just about covered the field of the various systems available. Nash also has been building a handful of truck chassis each week, most of them apparently consigned to export.

K-F Operations Up

WHEN Kaiser-Frazer dropped plans to continue a second shift at Willow Run some months ago, the wiseacres would have you believe the bloom was off this manufacturer's product and that sales were faltering. Quite the contrary, however, seemed to be the facts, inasmuch as single-shift operations have been inched up steadily to as high as 900 a day. Highest monthly total yet reached by K-F was in January—20,667—and schedules for June called for 21,000. The total actually realized was a little short due to a few recent defections by the working force resulting from engine assemblers' complaints over excessive heat. The industry still is waiting for the much-touted K-F convertible models, and a proposed two-door sedan or club coupe. Plans for a new assembly plant in Holland are shaping up and shipments of knock-down units to India are continuing. Damages in the K-F suit against Otis & Co. have been upped to $19 million as of last week.

Studebaker Makes 23,500

STUDEBAKER is rolling out approximately 3800 passenger cars and 1800-1900 trucks each week, well in excess of the prevailing level of a year ago. The June total, for example, was close to 23,500, against 15,500 a year ago. Removal of truck assembly operations to a new plant has opened up manufacturing considerably and further gains will be realized as intake of materials improves.

Jeep Engines for Army

WILLYS-OVERLAND is in process of transferring station wagon body production to Briggs Mfg. Co. in Detroit, along with a number of body stampings going into other models, although in the next few weeks it will resume on an even higher plane, close to 250 units daily. Overall weekly production, including jeeps and truck models, had been running in excess of 2500 units. First shipments of jeep engines for replacement and stockpiling by Army Ordnance, on an order for 17,600, have begun.

Independents Fare Better

RUNNING down the list of passenger car builders, it is seen readily that the independent companies are doing much better than a year ago, and even better than in the peak year of 1941. Inference is logical that they are receiving better than their share of available steel, although it must be kept in mind that special arrangements have been concluded by several of these companies to bulwark steel supplies. Hudson, Packard, Studebaker and Kaiser-Frazer all have resorted to unconventional techniques in this respect. The big three, on the other hand, are not showing important gains over 1947 and are still some distance, generally speaking, from the 1941 record. Steel suppliers as yet have not been able to step up shipments to permit car and truck assemblies to duplicate the pace of independent manufacturers. Higher unit requirements for steel and the unprecedented volume of replacement parts manufacture are mitigating factors.

Couldn't Save Heat

WATCHING the new 25-ton bessemer converters blowing at Great Lakes Steel Corp. the other day and talking with old-line steel men on the scene recalled the story of how at one time Ford was planning to install bessemer converters in his steel plant here. The catch was that Ford and his engineers were determined to figure out some way to utilize the vast amount of heat dissipated to the atmosphere by the tenuous bessemer flame. They mulled over the problem for months and finally gave it up as impossible. So the bessemer project at the Rouge plant was dropped, since Mr. Ford simply would not stand for all those heat units being blown away. Great Lakes' bessemers are used as duplexing units of "synthetic scrap," producers being charged with pig iron and a small amount of scrap which is blown down to a carbon content of 1.50-1.75 per cent and the metal then transferred to open hearths for refining.

Ford Tooling Costs $72 Million

BREAKDOWN of tooling costs for the 1949 Ford shows expenditure of about $72 million and 10 million man-hours for new machinery, rebuilding and redesigning of machines and their tooling. Of this total $37,451,000 and 6,000,000 man-hours were charged to designing, fabricating and trying out special machines, tools, dies, fixtures and jigs at Ford plants; and $34,615,567 for the purchase, installation, tooling and trying out other machinery, plus the replacement or renewal of parts on existing machines.

What's Interesting About UNION CHAIN'S Raw Materials?

Union Chains for Every Application

Drive and Conveying Chains and Sprockets
- Bridge Chain
- Combination Malleable Iron and Steel Chain
- HB (hardened bearing) type chain
- BP (bar and pin) type chain

★

Finished Steel Roller Chains and Sprockets
- All manufacturer's standard, size ⅜ in. to 2½ in. pitch
- Single and Multiple Strands
- Extended Pitch Series in sizes 1¼ in. to 4 in. pitch

★

Silent Chain and Sprockets
- All sizes ⅜ in. to 1½ in. pitch

★

Flexible Couplings
- Roller chain type
- Silent chain type

Sprocket chain is essentially an assembly of Sidebars, Bushings, Rollers and Pins, fabricated from Strips, Bars, and Rounds of steel.

Since UNION manufactures all types of steel sprocket chain for the transmission of power and the mechanical handling of materials and **nothing else,** the specifications of every lot of Steel which UNION buys, are determined only by the desire to build the greatest ultimate service into the particular chain part for which it is required. This circumstance should be interesting to UNION'S present and future customers.

The Union Chain and Manufacturing Company

TRANSMIT POWER
UNION CHAINS
CONVEY MATERIALS

Sandusky, Ohio, U.S.A.

"Mill Pool" Warehouse

Crucible Steel opens third master unit at Harrison, N. J., to ease distribution problem

STEEL distribution, major problem in the industry, is being tackled by Crucible Steel Co. of America which has come up with the "mill pool" warehousing system, third unit of which was opened last week at Harrison, N. J.

Crucible's prescription for the headache is a system of master warehouses, so located that they may be quickly and economically supplied with a wide variety of products from the company's various works. The new unit will serve nearby customers and also some of the 23 Crucible branch warehouses, as do the other "mill pool" facilities already operating in Syracuse, N. Y., and Pittsburgh. The Harrison warehouse is in the plant area of Crucible's Atha works, producer of precision castings, magnets and numerous special steel items. It is also adjacent to the Spaulding & Jennings Division plant, producer of cold-rolled steels. The facility will carry more than 150 different types of carbon, alloy and stainless steels in hundreds of sizes, plus billets for forgings. The expansion is part of a $30 million company-wide plant and warehouse improvement program.

METAL MAKERS: Speakers and participants in the recent meeting of the Electric Metal Makers Guild in Bethlehem, Pa., included C. E. Sims, right, assistant director, Battelle Memorial Institute, who spoke on hydrogen and nitrogen in steel; and the co-chairman of the forum on oxygen in electric furnace steelmaking, F. G. Vithelic, left, Michigan Steel Casting Co., Detroit, and H. Eisaman, standing, Carnegie-Illinois Steel Corp., Chicago

New Name Changes AFA to AFS

AMERICAN Foundrymen's Association, 52-year-old technical organization of the castings industry, has changed its name to American Foundrymen's Society, Secretary-treasurer William W. Maloney has announced.

The new name was adopted because it is more descriptive of society functions and conforms to the general practice in the names of other large, recognized technical and scientific groups.

Oil Field Equipment Firm Expands

GUSHING activity in the nation's oil industry has brought another expansion to swell the number of such developments made or to be made by manufacturers of oil field equipment. Flint Steel Corp., Tulsa, Okla., has ordered a car-type stress relieving furnace to be designed and erected by Rust Furnace Co., Pittsburgh.

The furnace, to be fired by natural gas, will be designed for a gross charge of 425,000 lbs and for temperatures up to 2000 degrees F. It will be 15 ft 2 in. wide, 85 ft long and 18 ft 6 in. in overall height. Design is under way and the unit should be in operation before the end of this year.

Blaw-Knox To Acquire Foote Co.

NEED for product diversification motivated Blaw-Knox Co. in its recently completed arrangements to acquire Foote Co. Inc., Nunda, N. Y., manufacturer of machinery for bituminous type paving. The Pittsburgh firm, which will acquire Foote through an exchange of stock, will operate it under its present management as a wholly-owned subsidiary. Foote also manufactures concrete paving mixers and designs and builds special machinery and equipment.

Small Rolling Mill Considered

JOHN Williams Steel Works, Jackson, Tenn., fabricator of structural steel and steel plate, is considering the possibility of installing a small rolling mill in the Jackson locality. Firm's intentions are to roll merchant bars and bar size shapes up to 3 in. on a small production scale to utilize an available tonnage of mild steel scrap with a 3-ton electric furnace.

National Lead Plans Oregon Unit

MORRIS P. Kirk Inc., a subsidiary of National Lead Co., has purchased 9.2 acres of industrial land at Portland, Oreg., from Bethlehem Steel Corp. National Lead plans construction of a $250,000 lead refinery. Its production will be used to supply lead primarily to battery producers in the Portland area.

Skirts, Steel Mark Lukens Span

PETTICOATS and pig iron figured prominently in one stage of the development of Lukens Steel Co. which last Friday observed its 138th anniversary as an iron and steel producer in Coatesville, Pa., under a continuous line of family ownership and management.

Lukens Steel was named for Rebecca Lukens, eldest daughter of Isaac Pennock who founded the firm as Brandywine Iron Works & Nail Factory. When her husband, Dr. Charles Lukens, died in 1825 after operating the mill for his father-in-law, Rebecca took over. Her daughter, Isabella, married Charles Huston, and they became the parents of Charles Lukens Huston, now first vice president; and grandparents of Charles Lukens Huston Jr., vice president, and Stewart Huston, secretary.

Today Lukens employs more than 5000 people, with a plant covering almost 600 acres. Its 1947 sales of steel plate and steel plate specialties, including those of its By-Products Steel Co. and Lukenweld, exceeded $52 million.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Turbodyne Corp. has been formed as a wholly owned, but autonomous, subsidiary of Northrop Aircraft Inc., Hawthorne, Calif. Thomas H. Quayle heads the unit which will conduct research on gas turbines for aircraft. Turbodyne had its organizational beginnings as Northrop-Hendy Co., joint research firm for Northrop and Joshua Hendy Iron Works. Northrop recently purchased the Joshua Hendy interest.

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Rite-O Tool & Gage Co. has moved to a new plant at 321 W. Ten-Mile Rd., Hazel Park, Mich.

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B. F. Goodrich Co., Akron, has completed a research center at Brecksville, O., midway between Cleveland and Akron. The center, located on 261 acres, consists of six buildings and a powerhouse.

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B. C. Ames Co., Waltham, Mass., manufacturer of micrometer dial gages and indicators, has named Sybrandt Co., Cleveland, as its agent in northeastern Ohio and Allan P. James Co., San Francisco, as its representative in northern California.

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Dravo Corp., Pittsburgh, has appointed Wilson C. Blake Co., Hartford, Conn., as distributor of Dravo "Counterflo" heaters in Connecticut and western Massachusetts.

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Ceco Steel Products Corp., producer of structural products made from steel and other metals, has moved its general offices to a new building at 5601 W. 26th St., Chicago. Firm's offices had been located at its Plant No. 1.

—o—

Agaloy Tubing Co., Springfield, O., manufacturer of alloy tubing, reports that the new postal address of its New York office is Box 99, Sheepshead Bay Station, Brooklyn. T. L. Lee is district manager.

—o—

United States Rubber Co., New York, is putting nylon over rubber insulation for electrical wire. Nylon permits use of smaller wire and gives the conductors better protection.

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American Machine & Foundry Co., New York, manufacturer of cigaret-making, bread-wrapping and other machinery, is currently testing its new pinspotter, a device that performs bowling alley pit service. A conservative manufacturing program with modest output is planned when the machines finally go into production.

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National Bureau of Standards, Washington, has the first five parts of the fifth edition of the National Electrical Safety Code available in one volume as NBS Handbook H30. Previously the parts were issued separately.

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Chicago Railroad Fair, commemorating the 100th anniversary of the opening of the Middle West by railroad transportation, will be held on Chicago's lake front July 20 to at least Sept. 7, with possibility of extension.

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Detroit Die Set Corp., Detroit, manufacturer of die sets and die makers' supplies, has appointed Ameco Co., Cleveland, as its sales representative for Ohio.

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L. G. S. Spring Clutch Corp., Indianapolis, subsidiary of Curtiss-Wright Corp., has named Frank W. Yarline & Co., Chicago, as its distributor for the Chicago area and Gregg & Spohn, Cincinnati, as its agent for the Cincinnati region. L. G. S. manufactures springs, clutches for automobiles, air craft, etc.

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Sperry Products Inc., manufacturer of flaw detectors, is moving its plant from Hoboken, N. J., to Danbury, Conn., Aug. 20.

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Diagraph-Bradley Industries, manufacturer of stencil cutting machines and shipping room apparatus and supplies, has moved its plant from St. Louis to Hebron, Ill., but offices will remain in St. Louis. Firm purchased a government surplus plant in Hebron.

—o—

Electro Refractories & Alloys Corp., Buffalo, manufacturer of refractories, nonferrous alloys and grinding wheels, has formed a wholly-owned subsidiary, Electro Refractories & Alloys Canada Ltd., to manufacture silicon carbide at a plant recently purchased at Cap-de-la-Madeleine, Que.

—o—

Liquid Conditioning Corp., Linden, N. J., manufacturer of equipment and materials for conditioning water and other liquids, has appointed P. M. Kline & Associates, Cleveland, as its representative in the Cleveland area.

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Weirton Steel Co., subsidiary of National Steel Co., recently held open houses at its Weirton, W. Va., and Steubenville, O., plants which were attended by almost 38,000 people.

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Wheeling Steel Corp., Wheeling, W. Va., recently held an open house at its Yorkville, O., mill which was attended by approximately 8000 people.

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Stromberg-Carlson Co., Rochester, N. Y., manufacturer of radios and other communications equipment, has taken over complete operations of Liberty Carillons Inc., New York, maker of electronic carillons and chimes.

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Monsanto Chemical Co., St. Louis, reports that construction has started on its $5 million atomic energy research plant at the old Scioto Ordnance works near Marion, O.

—o—

Consolidated Steel Corp., Los Angeles, has changed its name to Consolidated Western Steel Corp. Plants at South San Francisco, Vernon, Fresno, Bakersfield, Taft and Phoenix of Western Pipe & Steel Co. and the Berkeley plant of Steel Tank & Pipe Co. (both of which corporations are subsidiaries) are being operated as units of Consolidated under its new corporate name.

—o—

Cleveland Tapping Machine Co., Hartville, O., manufacturer of tapping machines, has named Meehan Engineering Co., Syracuse, N. Y., as its representative in upstate New York and Stanley Berg & Co., Pittsburgh, as its distributor in western Pennsylvania, West Virginia and southeastern Ohio.

—o—

United States Testing Co. Inc., Hoboken, N. J., firm specializing in the weather-testing of products, has completed arrangements with a proving ground operation in Miami, Fla., for actual exposures to sun, wind, rain and salt water.

—o—

Department of Commerce reports that payments to the United States for goods and services during the first quarter of 1948 declined from the previous quarter by $400 million to an annual rate of $17.8 billion. Decline in exports to Canada was particularly sharp.

—o—

Department of the Army will conduct a study of the emergency power situation in South Korea.

The Business Trend

SHARP CURTAILMENT of automobile production in the week ended June 26 cut short the trend toward attainment of a new 1948 high point in industrial activity. STEEL's index dropped three points to 166 per cent (preliminary) of the 1936-1939 weekly average. In the previous week it had reached 169 per cent, matching the year's high level achieved in late January.

OUTPUT—Production of durable goods rose in May to well above the April level and iron and steel output increased sharply as normal coal shipments were restored. Recovery in these products helped boost the Federal Reserve Board's seasonally adjusted index of overall activity four points to 192 per cent of the 1935-1939 average, only two points short of the peacetime record.

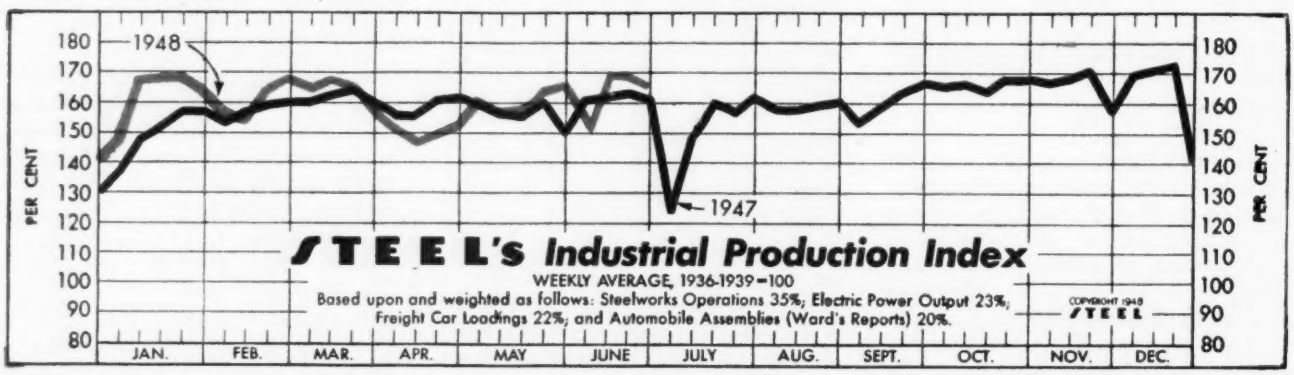
STEEL—Distribution, rather than production, of steel occupies the spotlight since Congress gave mandatory allocation powers to the administration. Even at the industry's recent production rates there has not been enough steel to satisfy all wants, and now with growing military requirements to be served first, many consumers face a bleaker-than-ever supply outlook.

COAL—Painful choice for steelmakers arose out of the contract terms settled upon by other mine operators. Cessation of mining would mire the steel industry much sooner now than in previous strike periods. But with coal at a higher price and miners' wages being hiked upward, the price-wage line of two months ago, already stretched taut, will snap with much more violence. Exceptionally high loadings of coal in recent months have resulted in near-records. In the June 19 week, for example, 204,258 cars were loaded, the highest, with the exception of one week in 1946, since 1930. Production for the year through June 19, however, totals only 268,879,000 tons, compared with 302,415,000 tons in the similar 1947 period.

CONSTRUCTION—Record peacetime dollar volume of construction contracts was let in May in the 37 states east of the Rockies and in only one month, June, 1942, was the latest month's figure of $970.8 million exceeded, according to F. W. Dodge Corp. The most pronounced gains in May over April and over May of last year were made in nonresidential building, although all major classifications of construction shared in the advance. Producers Council estimates all new domestic construction this year will approximate $16.4 billion, a 17 per cent gain over last year.

EMPLOYMENT—More than 44.5 million people were employed in nonagricultural industries in the month ended in mid-May, an increase of nearly 240,000 over the previous month, Bureau of Labor Statistics reports. Lower employment in manufacturing industries was more than offset by expanding construction activity and resumption of coal mining.

GEARS—Volume of business done by the gear industry in May was 11.6 per cent lower than in April, American Gear Manufacturers Association's index slipping to 283.6 per cent of the 1935-1939 average.



Index (chart above): Week ended June 26 (preliminary) 166 Previous Week 169 Month Ago 164 Year Ago 161

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	96.0	96.0	96.0	96.5
Electric Power Distributed (million kilowatt hours)	5,257	5,159	5,076	4,675
Bituminous Coal Production (daily av.—1000 tons)	2,233	2,217	2,278	2,140
Petroleum Production (daily av.—1000 bbl.)	5,494	5,492	5,452	5,109
Construction Volume (ENR—Unit $1,000,000)	$160.2	$126.9	$189.9	$143.5
Automobile and Truck Output (Ward's—number units)	94,054	109,259	92,772	103,203

* Dates on request. † 1948 weekly capacity is 1,802,476 net tons. 1947 was 1,749,928 net tons.

TRADE				
Freight Carloadings (unit—1000 cars)	900†	907	905	846
Business Failures (Dun & Bradstreet, number)	111	100	112	60
Money in Circulation (in millions of dollars)‡	$27,792	$27,808	$27,700	$28,183
Department Store Sales (change from like wk. a yr. ago)‡	+21%	+1%	+7%	+3%

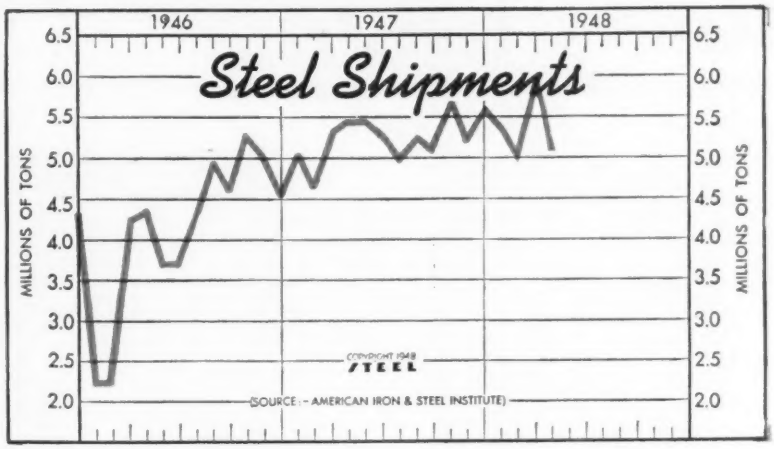
† Preliminary. ‡ Federal Reserve Board.

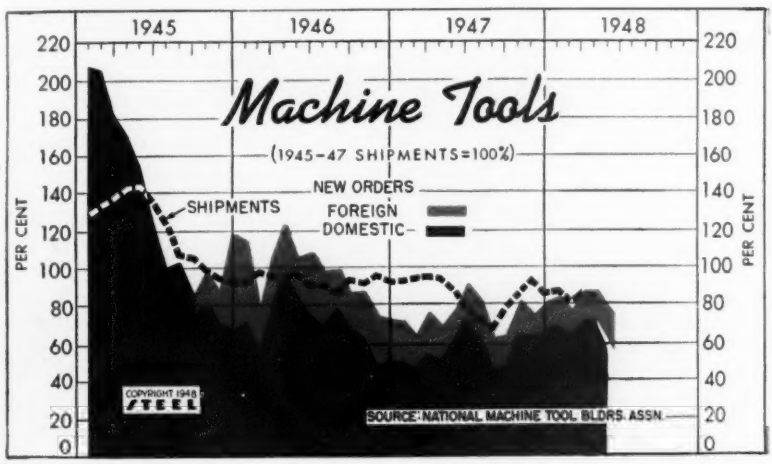
Steel Shipments

(Net Tons)

	1948	1947	1946
Jan.	5,410,438	5,061,333	2,189,369*
Feb.	5,046,115	4,626,424	2,189,368*
Mar.	5,978,551	5,304,415	4,213,913
Apr.	5,096,161	5,445,993	4,335,694
May	.....	5,442,343	3,666,677
June	.....	5,263,711	3,687,509
July	.....	4,974,566	4,259,494
Aug.	.....	5,278,223	4,965,456
Sept.	.....	5,118,839	4,589,902
Oct.	.....	5,681,597	5,260,832
Nov.	.....	5,216,990	5,019,984
Dec.	.....	5,613,036	4,533,420

* Figures for January and February, 1946, are merely averages derived from a report that combined shipments for those two strike-affected months into a total of 4,378,737.





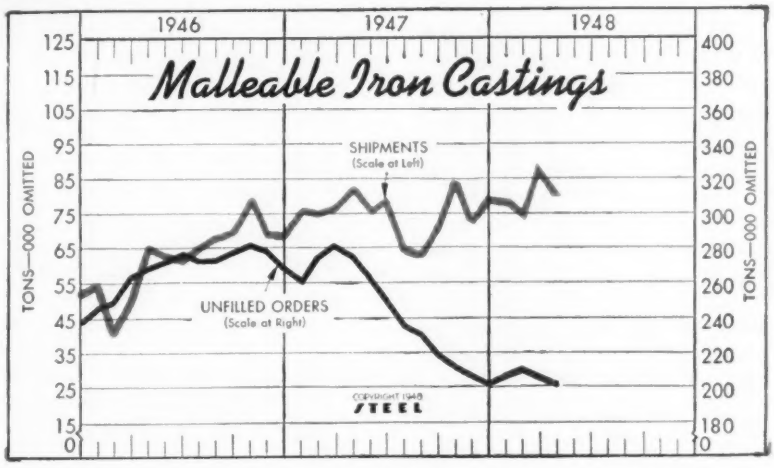
Machine Tools

(1945-47 Shipments = 100)

	Orders—Total		Orders—Domestic		Shipments (3 Mos. Ave. Centered)	
	1948	1947	1948	1947	1948	1947
Jan.	83.1	71.7	69.1	50.7	86.9	93.1
Feb.	77.3	63.8	64.6	48.0	81.9	94.8
Mar.	86.3	74.3	70.2	54.2	84.2	95.4
Apr.	86.3	69.8	72.2	51.0	82.7	94.3
May	73.0	76.9	57.8	60.6	...	88.9
June	...	90.9	...	73.7	...	79.5
July	...	81.1	...	64.4	...	71.0
Aug.	...	62.1	...	47.5	...	68.6
Sept.	...	63.7	...	49.0	...	78.5
Oct.	...	81.0	...	65.0	...	85.5
Nov.	...	75.6	...	64.1	...	92.6
Dec.	...	81.1	...	66.3	...	86.1

Malleable Iron Castings

	Shipments (000 omitted)		Unfilled orders for castings for sale (000 omitted)	
	1948	1947	1948	1947
Jan.	77.7	75.9	206	260
Feb.	75.2	74.7	209	274
Mar.	86.8	76.6	203	281
Apr.	80.6	81.9	200	275
May	...	75.5	...	262
June	...	78.5	...	249
July	...	64.2	...	235
Aug.	...	62.4	...	230
Sept.	...	71.6	...	218
Oct.	...	84.0	...	211
Nov.	...	72.1	...	206
Dec.	...	77.8	...	202
Total	...	895.1	...	...



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$15,145	$14,248	$14,097	$12,670
Federal Gross Debt (billions)	$251.7	$251.5	$252.2	$257.7
Bond Volume, NYSE (millions)	$24.1	$25.2	$28.4	$19.5
Stocks Sales, NYSE (thousands)	7,631	7,727	8,234	4,336
Loans and Investments (billions)†	$63.1	$63.4	$63.5	$63.4
United States Gov't. Obligations Held (millions)†	$35,250	$35,667	$35,866	$39,246

† Member banks, Federal Reserve System.

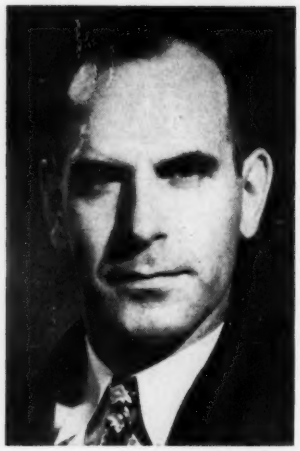
PRICES

STEEL's composite finished steel price average	$80.27	$80.27	$80.27	$69.82
All Commodities†	165.3	164.9	163.5	147.8
Industrial Raw Materials†	182.7	181.6	178.6	161.5
Manufactured Products†	159.5	159.3	158.7	142.9

† Bureau of Labor Statistics Index, 1926 = 100.

Men of Industry

A. S. NIPPES



D. J. HEDGECOCK

BENJAMIN F. McCLANCY

Elliott Co., Jeannette, Pa., announces the appointment of **A. S. Nippes** as superintendent of manufacturing, Jeannette Division. After attending Penn State, where he studied mechanical engineering, Mr. Nippes joined the Hygrade Sylvania Corp., Emporium, Pa. In 1940 he became associated with Bendix Aviation Corp., Philadelphia, as general foreman of production engineering. Mr. Nippes joined the Elliott Co. in 1945, assuming charge of the equipment and methods department.

—o—

Howard Marston, for the past 10 years sales and service engineer, Boston branch, Minneapolis - Honeywell Regulator Co., has been appointed industrial manager of the Brown Division of the company in Minneapolis and St. Paul. **Earl S. Bush** has been named Chicago industrial sales engineer for the steel industry for the Brown Division, succeeding **A. J. Potts. Larry E. Singleton** will succeed Mr. Bush as the Chicago branch industrial service manager. **I. K. Farley** has been appointed industrial manager of the Houston, Tex., branch of the Brown Division, and **R. L. Mallory,** branch manager for the Houston Honeywell branch, will devote more of his time to the overall industrial activities of the Brown Division and the parent company in the Southwest area.

—o—

Park Q. Wray Sr., automotive parts sales expert, and executive of the National Motor Bearing Co. Inc., Redwood City, Calif., has been named to the board of directors of the company. He has been general manager, Replacement Division of the company for the past 10 years, and will remain at this post in addition to serving as a member of the board of directors.

—o—

D. J. Hedgecock has been appointed engineering specialist in the Wire, Rod, Bar & Structural Division, Reynolds Metals Co., Louisville. He succeeds **T. E. Bowen,** resigned. In his new position, Mr. Hedgecock will devote his efforts principally to the promotion of new uses for aluminum in the structural engineering field. He has been serving for the last year as sales engineer, specializing on the Reynolds Alumi-Drome, and previously was chief engineer and acting plant manager at Reynolds' Newark, O., plant.

—o—

George Hardesty, formerly head of production control for tractor manufacturing at the Highland Park plant of Ford Motor Co., Detroit, has been named director of production control for the entire plant. **C. B. VerDuin** has been appointed resident controller, and **A. M. Wilson,** traffic manager.

—o—

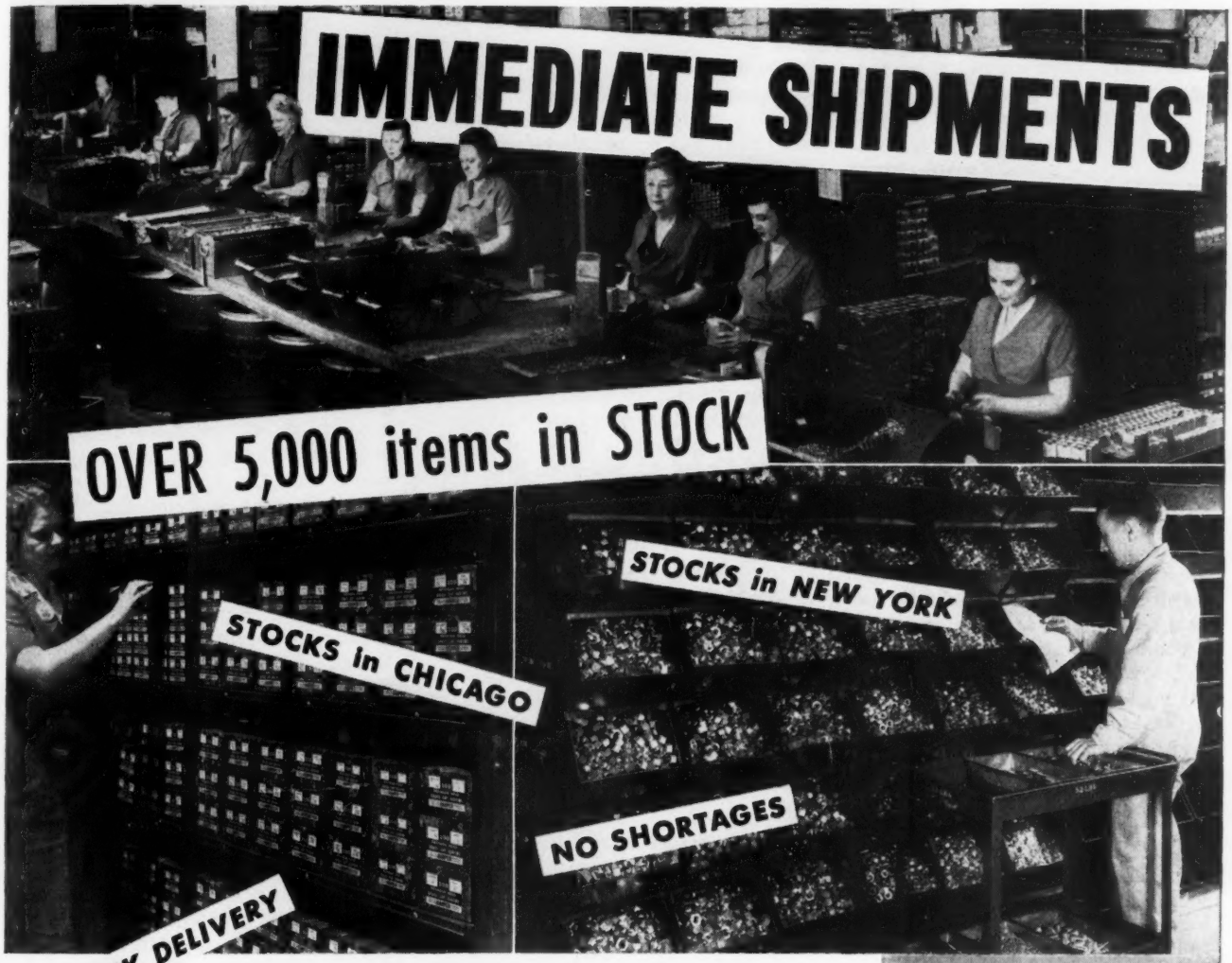
Thor Corp., Chicago, announces the election of **H. C. Buckingham** as vice president in charge of plant operations, a newly-created office. Mr. Buckingham has been treasurer since 1943. He is succeeded in that position by **Raymond J. Healy,** who adds the office of treasurer to his previously held position of secretary. Mr. Buckingham will have under his jurisdiction the corporation's plants at Cicero and Bloomington, Ill., El Monte, Calif., and Toronto, Canada. He joined Thor in 1935 as assistant to the controller. He later became controller and general manager of the Toronto plant, and returned to Chicago in 1942 to become controller for the corporation. He was elected assistant treasurer in 1942 and treasurer in 1943. Mr. Healy became assistant to the president of Thor in 1933, and two years later was elected secretary of the corporation. **Roy W. Wiley** has been appointed director of purchases for the corporation.

—o—

Benjamin F. McClancy has been appointed general manager of the Associated Industries, Cleveland, and will assume his new post Aug. 1. He has been director of Human Relations Division, ATF Inc., Elizabeth, N. J., parent firm of American Type Founders Inc., American Type Founders Sales Corp., Daystrom Corp., Daystrom Laminates Inc., and Frederick Hart & Co. Inc. Mr. McClancy became associated with the industrial relations field when he assumed the managership of the industrial relations department of John A. Roebling Sons & Co. in Trenton, N. J., and he continued in that post until he joined ATF. As manager of Associated Industries, Mr. McClancy succeeds **Chester Nikodym,** who resigned several months ago to engage in the private practice of law. **W. R. Meredith,** who has served on the Associated Industries' staff since 1946, has been named director of labor relations. In addition to **John Walker,** Mr. Meredith will be assisted by **Harvey L. Ennis** and **Hubbard C. Capes.**

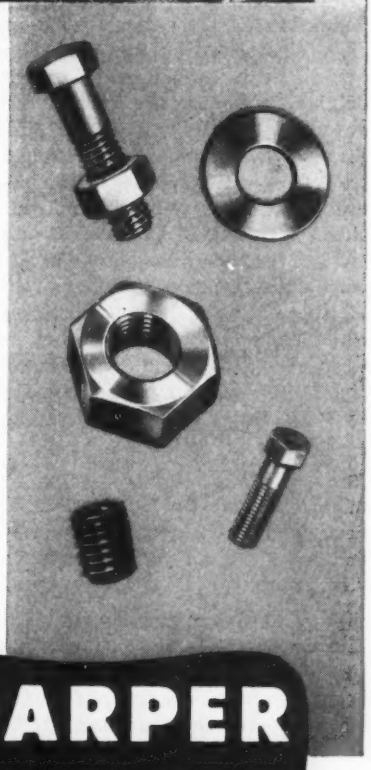
—o—

J. Carl Bode, formerly operating manager, has been elected president of National Carbide Corp., subsidiary of Air Reduction Sales Co., New York. He succeeds **L. A. Hull,** who has been made chairman of the board of directors. Mr. Hull joined the Air



non-ferrous and stainless

fastenings



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Reduction organization in 1917. He served with National Carbide as sales manager and later as vice president, and was elected president in 1941. Mr. Bode joined the company in 1928, and served variously as superintendent, carbide plant, Keokuk, Iowa; works manager, Louisville; and assistant operating manager, New York. He was made operating manager in 1947.

—o—

P. F. Bauer has been named manager of a newly formed central region of Allis-Chalmers Mfg. Co.'s General Machinery Division, with headquarters in Cleveland. Mr. Bauer joined Allis-Chalmers in 1928, and served as a salesman in the Pittsburgh district office until March, 1942, when he was named manager of the firm's industrial sales department. Mr. Bauer is vice chairman of the Manufacturers Division of the American Mining Congress, and has served as a director of the Foundry Equipment Manufacturers Association. The new region embraces district office territories of Cleveland, Toledo, Pittsburgh, Youngstown, Wheeling, Cincinnati, Detroit, Grand Rapids and Jackson.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, announces the formation of a sixth region for its General Machinery Division's field organization under **William Arthur,** formerly Philadelphia district office manager. The new area, designated as the Mid-Atlantic region, with headquarters in Philadelphia, will embrace territory now covered by Philadelphia, Wilkes-Barre, Baltimore, York, Richmond and Charleston offices. The York and Charleston offices, managed by **G. E. Conn** and **R. L. Halsted,** respectively, formerly branch offices, become district offices under the regional plan. Mr. Arthur is succeeded at Philadelphia by **Frank Freyler,** manager of the Cincinnati district office since 1944, who in turn is succeeded by **W. F. Daly.**

—o—

Berle Ludwig, former ship yards superintendent in Mobile, Ala., has been appointed general superintendent at Kerrigan Iron Works, Nashville, Tenn.

—o—

Murner E. Thor, Norton Co., Worcester, Mass., Refractories Division, has been appointed refractories engineer. He will cover the Canadian and New England territories formerly handled by **E. A. Fischer.** Mr. Thor will have headquarters in Worcester. Mr. Fischer transfers to the refractories sale engineering department as sales engineer. **Harlan T. Pierpont Jr.** has been appointed sales manager, Refractories Division, succeeding **Robert Kirkpatrick,** retired. Mr. Pierpont formerly was abrasive engineer for Norton Co. in Michigan. Mr. Kirkpatrick leaves after 29 years' service with the company. **Norman V. Crabtree** has been assigned to take over the territory recently covered by Mr. Pierpont. **Richard H. Merchant**, formerly field engineer in Detroit, has been appointed abrasive engineer, and assumes responsibility for Mr. Crabtree's area. **Dr. W. Irving Clark,** medical director of Norton Co., has retired after 37 years with the company. He is succeeded by **Dr. Karl T. Benedict,** who has served several years as a part-time staff doctor. Dr. Clark started his career with Norton as a company physician in 1911. He was made director of personnel in 1919, a position from which he retired in January, 1947, to become medical director.

—o—

Arthur E. Currier has joined the research department, Harbison-Walker Refractories Co., Pittsburgh.

—o—

Carl J. Snyder has been appointed general manager, Lynch Rd. plant, Detroit, Chrysler Corp., and **Frank J. Morisette** has been made general staff master mechanic of the entire corporation. Mr. Snyder, formerly general staff master mechanic, succeeds the late **J. M. Hartgering,** who had been in charge of the Lynch Rd. plant. Mr. Morisette was promoted from the staff of **H. L. Weckler,** vice president and general manager.

—o—

D. A. Merson and **Harry C. Wildner** have been elected vice presidents of National Lead Co., New York. Mr. Wildner has been comptroller since 1946, and Mr. Merson has been manager of sales in charge of paints, oils and pigments. Both are directors and members of the executive committee. **Henry O. Bates,** who started with National Lead in 1902, has retired as secretary of the company, and has been succeeded by **John B. Henrich,** former assistant secretary. **Thomas F. Owens** has been appointed assistant secretary.

—o—

Kent Cliff Laboratories, Peekskill, N. Y., makers of Micro Hardness Testing and allied equipment, announces appointment of **Edward H. Enberg Jr.** in charge of all standardization, and **John B. Verrier Jr.,** in charge of sales. Both Mr. Enberg and Mr. Verrier have been associated for many years in similar capacities with Wilson Mechanical Instrument Co. Inc., New York.

—o—

Elastic Stop Nut Corp. of America, Union, N. J., has appointed **D. E. Lally** as assistant general sales manager. Mr. Lally joined the company in 1943, and previously was associated with Abbotts Dairies Inc., Philadelphia.

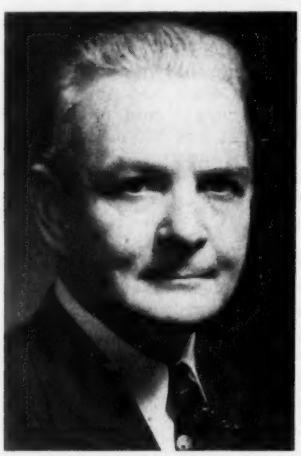
—o—

Ralph S. Poulsen, Lindberg Engineering Co., Chicago, manufacturer of heat treating and melting furnaces, has been appointed district sales manager for the Ohio territory. His headquarters will be in Cleveland.

—o—

James E. Bennett has been elected general counsel, Youngstown Sheet & Tube Co., Youngstown. Mr. Bennett, former court of appeals judge and former president, Youngstown Chamber of Commerce, was elected assistant secretary and assistant general counsel last October to handle the company's legal work during the absence of **J. C. Argetsinger.** Mr. Argetsinger, who resigned as general

CARL J. SNYDER



FRANK J. MORISETTE

A four-drawer, Class 6000 N-C-R Cash Register surrounded by some of the many stampings for this and other models.

How 230 Bliss Presses keep busy at National Cash Register

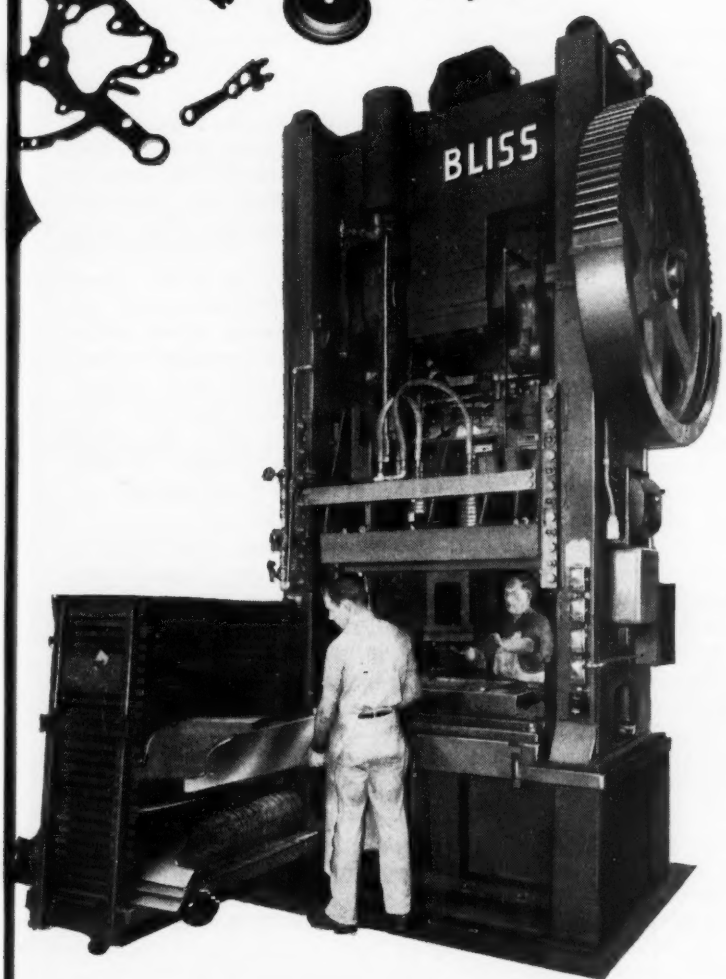
Short production runs on literally thousands of different sizes and shapes of parts mean frequent die change-over at National Cash Register Company's Dayton plant. Here's where press flexibility, ease of set-up and uniform production are "musts."

That's why 230 Bliss presses, large and small, are kept busy from one end of N-C-R's production line to the other, blanking, drawing and forming the wide variety of stampings that go into cash registers, adding and accounting machines.

"We've had sustained performance with little 'downtime' over several decades of operation with Bliss presses," says National's press superintendent. "And Bliss has worked with us in providing special engineering to solve our stamping problems. We like the safety features built into Bliss presses, too."

This is another case example of why Bliss presses—mechanical or hydraulic—are preferred throughout the pressed-metal industry. Besides pioneering in press improvements and design, Bliss offers you a fund of engineering knowledge—going back over 90 years, all adding up to the fact that "Bliss" on your press is more than a name—it's a guarantee.

To get the most out of press production, discuss your problems with a Bliss engineer. Send for him today.



Bliss 165-ton double crank press, with a Bliss-Marquette Air Cushion with locking device in the bed, is used to form cash register cabinets. Marquette Cushions are also installed on the slide for knockout work.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Hastings, Mich.; New York, Rochester, N. Y.; Cleveland, Dayton, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; New Haven, Conn.; Windsor, Ont.

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counsel due to illness, will continue as a vice president and secretary. Mr. Bennett will continue as assistant secretary as well as general counsel.

—o—

C. B. Householder has been named to the new position of manager of fuel tank department, Aviation Products Division, Goodyear Tire & Rubber Co., Akron, Mr. Householder was formerly a sales engineer responsible for all Goodyear contacts with airlines in the eastern part of the United States. He is succeeded in this position by **E. M. Humphrey,** transferred from the New York office of the Aviation Products Division. Mr. Humphrey will be replaced by **W. A. Carlson,** formerly at the Miami, Fla., office. **G. R. Price** succeeds Mr. Carlson at Miami.

—o—

George Deike, president, Mine Safety Appliances Co., Pittsburgh, and his son, **George Deike Jr.,** chief engineer of the company, have been awarded the graduate degree of Engineer of Mines by Pennsylvania State College for their theses on the coal industry. Mr. Deike's thesis is the "History of the Fatality Record in Coal Mines in This Country from 1900 to 1906," and his son received his degree for "History of Rock Dust Machinery in the Coal Mines in This Country from 1926 to 1948." Mr. Deike is one of the founders of the Mine Safety Appliances Co., manufacturer of approved safety equipment for industry.

—o—

All officers and directors of American Cladmetals Co., Pittsburgh, were renamed at the company's annual meeting. **C. R. Anthony** was named again as chairman of the board of directors, **Joseph Kinney Jr.** was re-elected president, **John J. Kernan** remains as vice president, and **Porter S. Kier** holds the posts of assistant secretary and assistant treasurer.

—o—

C. A. Hubley has been appointed representative in the western Michigan territory for Detroit Die Set Corp., Detroit. He has had many years' experience in the industrial field and was formerly connected with C. M. Sutton Sales Co. Mr. Hubley will make his headquarters at the home office, Detroit.

—o—

Everett S. Lee, engineer, general engineering and consulting laboratory, General Electric Corp., Schenectady, N. Y., has been elected president, American Institute of Electrical Engineers for the year beginning Aug. 1, 1948. Other officers elected are: Vice presidents—**Victor Siegfried,** Worcester, Mass.; **John L. Callahan,** New York; **Ira A. Terry,** Fort Wayne, Ind.; **George N. Pingree,** Dallas, Tex.; **Richard McKay,** Spokane, Wash. Directors elected are: **Clarence W. Fick,** Cleveland; **Morris D. Hooven,** Newark, N. J.; **F. O. McMillan,** Corvallis, Oreg. **W. I. Slichter,** New York, has been re-elected treasurer.

—o—

Dr. Philip J. Wilson Jr. has left Mellon Institute to join the Research and Development Division of his fellowship donor, the Carnegie-Illinois Steel Corp., Pittsburgh, as a research associate, where he will supervise the work on process design. On the Carnegie-Illinois fellowship in Mellon Institute, he held the post of senior fellow since the inception of this fellowship, May, 1933. **Dr. Joseph H. Wells,** who has been on the fellowship since it was founded, will now head its activities.

—o—

John T. Porter has been appointed Pacific Coast representative for the department of education, American Type Founders Sales Corp., and will make his headquarters in the company's Los Angeles offices.

—o—

John R. Egan has been named advertising manager of Hamilton Beach Co., Racine, Wis., manufacturer of electrical appliances for soda fountain and domestic use.

—o—

Thomas R. Turner, new divisional sales representative for the Roselle, N. J., firm, Watson- Stillman Co., will handle the sale of the company's **W-S** hydraulic machinery in Virginia, Maryland, Delaware, southern New Jersey and eastern Pennsylvania. He will work out of the home office.

—o—

Gustave Heinemann, since 1934 chief chemist at the Corpus Christi, Tex., plant operated by Southern Alkali Corp., Pittsburgh Plate Glass Co., will assume the additional duties of technical director. Prior to his association with Southern Alkali, Mr. Heinemann served as a chemical engineer for four years at Pittsburgh Plate Glass Co.'s alkali producing plant at Barberton, O.

—o—

H. L. Poulton, advertising manager, Columbia Chemicals Division, Pittsburgh Plate Glass Co., Pittsburgh, has been elected president, Pittsburgh Industrial Advertising Council. **R. C. Myers,** manager, Market Development Division, Carnegie-Illinois Steel Corp., has been chosen vice president.

—o—

Charles Scherer, Davenport Machine & Foundry Co., Davenport, Iowa, has been elected chairman of the

GEORGE L. DAVIS

Quad Cities Local Management Group of Gray Iron Founders' Society, Cleveland. Other officers elected are: **Lee White,** Climax Engineering Co., Clinton, Iowa, vice chairman, and **John Diedrich,** Blackhawk Foundry & Machine Co., Davenport, secretary-treasurer.

—o—

George L. Davis has been elected president, Vulcan Soot Blower Corp., DuBois, Pa., and director of Northern Equipment Co., Erie, Pa. Recently purchased by Continental Foundry & Machine Co., Chicago, both companies are manufacturers of power plant equipment. Mr. Davis has had experience in the power plant equipment field as vice president of Diamond Power Specialty Corp., Detroit, and general staff manager-sales, Carnegie-Illinois Steel Corp. Mr. Davis also served as vice president, Methods Engineering Council, Pittsburgh.

—o—

George W. Kratz has been elected a director, Pittsburgh Consolidation Coal Co., Pittsburgh, filling the vacancy created by the recent death of **Barton P. Turnbull.** Mr. Kratz is a vice president of the company.

—o—

John W. Mowry has been appointed assistant district manager, Pittsburgh, for United States Steel Supply Corp., U. S. Steel Corp. subsidiary. He joined the staff of this subsidiary company in 1933 after previously serving for three years with Carnegie-Illinois Steel Corp. subsidiary.

—o—

Robert T. Keller, vice president, Marine and Industrial Engine Division, Chrysler Corp., Detroit, has been named president, succeeding **D. A. Wallace,** who continues as president of the Chrysler Division of the corporation, and as vice president of the engine unit. **A. M. Fleming,** vice president, Pekin Wood Products Di-

vision of Chrysler Corp., at West Helena, Ark., has been appointed president, succeeding Mr. Wallace, who continues, also, as vice president of that division. Mr. Fleming also is general works manager of the Chrysler Division, and remains in that post.

—o—

L. D. Litsey has been appointed Chicago area representative for worm gear speed reducers for De Laval Steam Turbine Co., Trenton, N. J. Mr. Litsey has had wide experience in the application of industrial equipment with Standard Seamless Tubes Co., Wykoff Drawn Steel Co., and Bartlett Hayward Co., and later with John Waldron Corp. as sales engineer and manager of the company's Coupling Division. Headquarters for Mr. Litsey will be maintained at the Litsey Equipment Co., Chicago. Other De Laval products will continue to be handled by the Chicago district office of De Laval Steam Turbine Co.

—o—

John C. Hines has been appointed sales manager of AC Spark Plug Co., division of General Motors Corp. **Wilson S. Isherwood** continues as vice president of this division and also as general sales manager. Mr. Hines, who formerly was regional manager for AC in Philadelphia, started with the company in 1915 as a salesman. He will be succeeded in Philadelphia by **James F. Kingsley,** connected with the AC sales department since 1924.

ROBERT B. PARKER

Appointed manager of sales, Washington, Special Accounts Office, Carnegie-Illinois Steel Corp. Noted in STEEL, June 28 issue, p. 66

—o—

John Krause Jr. has been appointed assistant manager of sales, Industrial Fasteners Division, Oliver Iron & Steel Corp., Pittsburgh. Mr. Krause joined the corporation in 1927, and for many years had been associated with the estimating department. He later joined the sales department, where he most recently served as sales office manager, Industrial Fasteners Division.

—o—

Winthrop Withington and **A. W. Ferguson** have resigned as vice presidents of American Fork and Hoe Co., Geneva, O.

—o—

Gen. William H. Harrison has been elected president and a director of International Telephone & Telegraph Corp., New York, to become effective Sept. 1. **Col. Sosthenes Behn,** who with his brother, **Hernand,** founded the company in 1920, will continue as chairman of the corporation and chief executive officer, thus again separating that office from the office of president, which he has also held since the death of his brother in 1933. Gen. Harrison leaves the post of vice president in charge of operations and engineering, American Telephone & Telegraph Co. The appointment of Gen. Harrison to the presidency permits Col. Behn to devote more time to international problems of the corporation, and free to spend necessary time abroad in the interest of these problems.

—o—

Peter F. Rossmann, formerly assistant to the president, Curtiss-Wright Corp., New York, in connection with that corporation's diversification activities, has been elected president of Symington - Gould Corp., Depew, N. Y. He succeeds **J. A. Sauer,** who is retiring as president after 40 years' service with the Symington interests. Mr. Sauer will continue to serve as a member of the board and as chairman of the finance committee.

OBITUARIES . . .

Arthur A. Aronson, well known steel purchasing agent, died June 28. He was with International Harvester Co., Chicago, for many years, and later was assistant to the president, Crucible Steel Co., New York. In recent years Mr. Aronson was president of his own company, Arthur A. Aronson Inc.

—o—

Lawrence H. Underwood, 67, assistant to the vice president in charge of operations, Youngstown Sheet & Tube Co., Youngstown, died June 26. He joined the company in 1925, and for the past 13 years was assistant to the vice president-operations. Mr. Underwood supervised the company's coal mining properties, and did extensive research work in plastics.

—o—

John Edwards, recently retired as assistant treasurer, Mesta Machine Co., Pittsburgh, died June 20.

—o—

Robert C. Ferguson, 65, plant engineer, Osborn Mfg. Co., Cleveland, until he retired in 1944, died recently.

—o—

Charles H. Moritz, 72, former vice president, Aluminum Co. of America, Pittsburgh, died June 27. He retired from the company in 1931 after 13 years as vice president, and 30 years' association with the company.

—o—

John L. Morrissey, 68, vice president, Ferry Cap & Set Screw Co., Cleveland, was killed recently when struck by a bolt of lightning on a Hot Springs, Va., golf course.

—o—

A. Felix du Pont Sr., 69, a director, E. I. du Pont de Nemours Co., Wilmington, Del., and former vice president and finance committee chairman, died June 29 at his summer home. He had been ill for several weeks.

—o—

Francis J. Kelley, 72, retired vice president, New Home Sewing Machine Co., Rockford, Ill., died June 25.

—o—

William J. Reidy, 56, district manager at Chicago of American Zinc, Lead & Smelting Co., St. Louis, died June 20. He had been connected with the company for 29 years, and manager of the Chicago office since 1930.

—o—

J. L. Lipschutz, 49, vice president, United Pressed Steel Co., Detroit, died recently. He had been connected with the steel industry for 30 years.

—o—

Howard S. Fritts, 71, inventor and holder of patents on a new type automobile chain, died at his home in Washington, N. J., June 25. He was president, Skidmaster Chain Inc., Easton, Pa.

—o—

Edward J. O'Connor, 39, president, American Society of Safety Engineers, and safety manager of the Harrison Radiator Division, General Motors Corp. in Buffalo, died June 28 in Buffalo.

—o—

Franklin S. Jerome, 77, president, Seymour Mfg. Co., Seymour, Conn., died June 22. He was also chairman of American Crucible Co., Shelton, Conn., and president of Mullite Refractories, Shelton.

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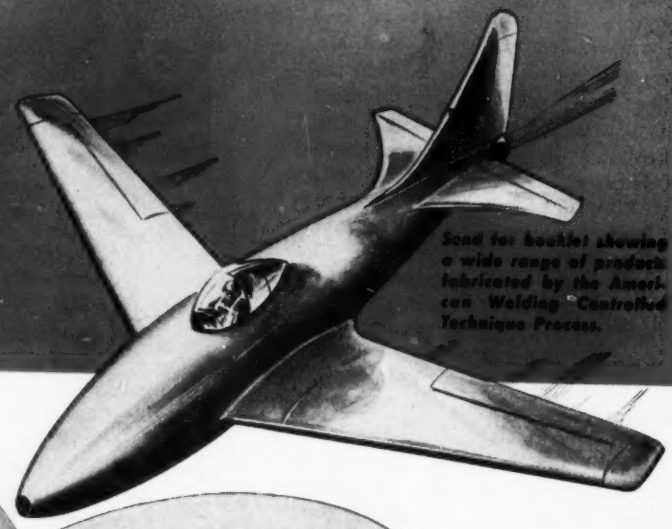
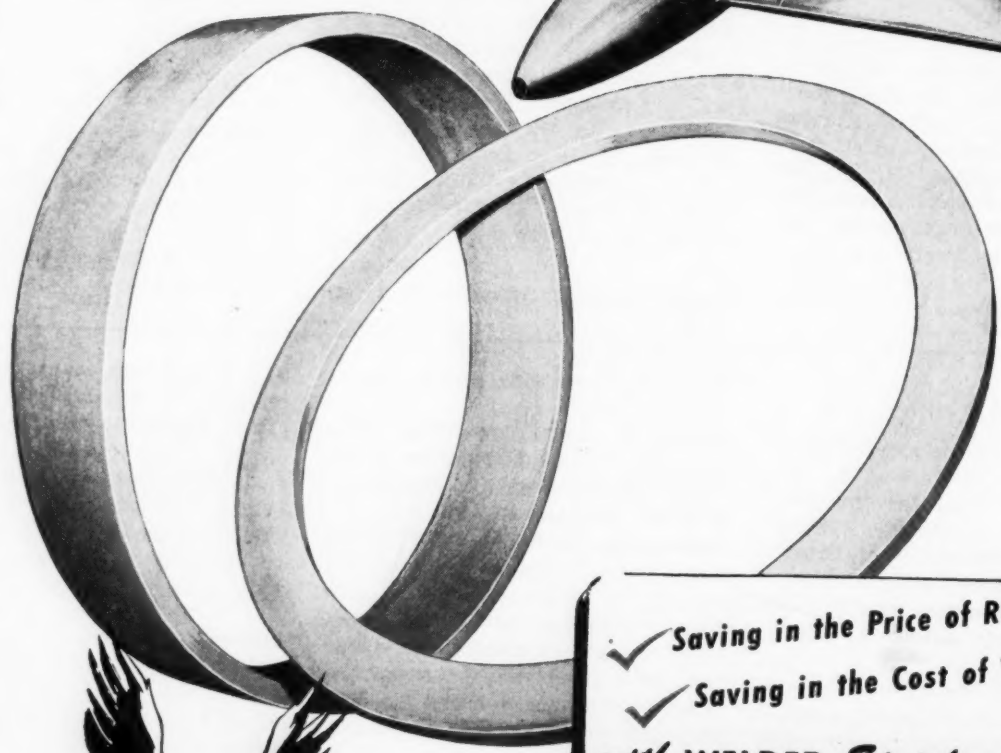
It takes more than steel and a flash welder to make "jet" rings . . . it takes real "know-how" plus high quality workmanship and our Controlled Technique. American-Welded Rings by the thousands now fly the sky-ways . . . repeat orders are now in production. This is but one application of the many ferrous and non-ferrous welded products we manufacture. You'll be ahead if you use the American Welding process of fabrication. An American Welding representative will be glad to explain.



Send for booklet showing a wide range of products fabricated by the American Welding "Controlled Technique Process."



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✓ Saving in the Cost of Tooling
with WELDED *Stainless Rings*

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Engineering News . . . AT A GLANCE

FREE MAINTENANCE FOR TEN YEARS— In Chicago, it was learned, Royal Metal Mfg. Co., is now offering its customers a free 10-year maintenance plan on the metal construction of its industrial chairs. The guarantee is offered in form of a written, registered policy that further entitles the holder, for a minimum service charge, to return chairs for refinishing or re-upholstering at any time such repairs are requested. The move was instigated, Royal reports, because industry today is economy minded and getting more so—watching both depreciation and maintenance costs more closely. Such a trend, it feels, can only be offset by producing a quality product, then taking, wherever feasible, some of the maintenance cost off the customer's shoulders.

DAMPING CAPACITY SECONDARY— Material damping properties definitely are of secondary importance in designing parts of cast and wrought metals, according to the Drop Forging Association in its recent publication. Although the study of the damping property of materials is still comparatively new, in the present state of our knowledge, it is assumed to have no direct bearing upon performance of a material under steady or static conditions. Vibration dampers, it is pointed out, often can be designed to dispose of large amounts of vibratory energy when a given design indicates existence of critical vibration. Thus the designer is able to select materials on the basis of other factors of strength and toughness that provide greater service life—even though the material itself might be very low in damping capacity.

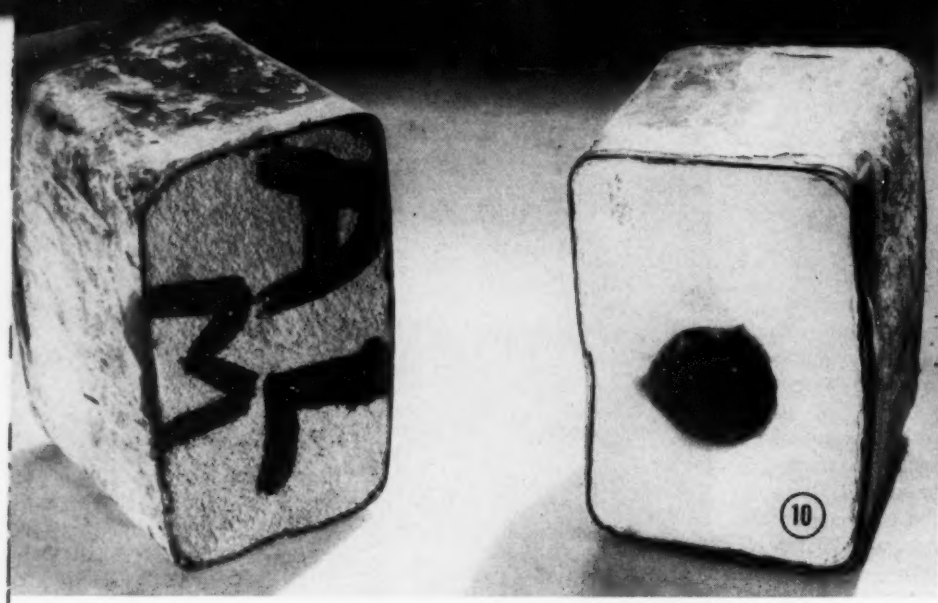
NOW—NYLON BEARINGS— Widespread use of nylon plastic for bearings in working parts of light machinery and equipment was forecast recently by plastic experts of the DuPont Co., Wilmington, Del., following successful use of the material for wheel bearings in a new line of baby carriages. While this is one of the first bearing applications of nylon to go into commercial production, many other bearing and gear uses are being evaluated, and early adoption expected in friction parts of light electrical equipment. Such bearings are reported to withstand service temperatures as high as 325° F, although in many cases higher temperatures can be tolerated. In addition, no lubricant is required for these bearings under light load at high speeds or moderate load at low speeds.

REMOTE CONTROL ENGINEERING— Most important single field in the future development of atomic energy may be remote control engineering, Dr. C. C. Simpson of the Argonne National Laboratory, Chicago, told members of the American Society of Mechanical Engineers in Milwaukee recently. The urge to produce an automaton should no longer be for spectacular exhibitions only, but for very practical needs, he pointed out. Scientists will want to handle ever increasing amounts of radio active materials and to do ever increasingly difficult experiments with them. Speed with which nuclear research advances in the future, depends on the speed apparatus is developed to carry on operations in an air-tight structure heavily shielded against the deadly radiation damage.

NO ALLOWANCE FOR SHIFT— Sometimes, it is necessary to use two to three sets of dies to make a drop forging. In some cases drop forgings may not be so heavy or large, but may be quite spread out. In all cases, however, finishing or final forging impression is placed in the center of the dies, or as near center as possible. This is done to reduce the tendency toward misalignment, or die shaft in the drop forging. Even if dies are lined up properly with each other, the drop forging operation tends to pull the upper or ram die out of alignment, and it is important to keep this from happening. If two dies do not mate correctly, the finished forging may be unusable. (p. 76)

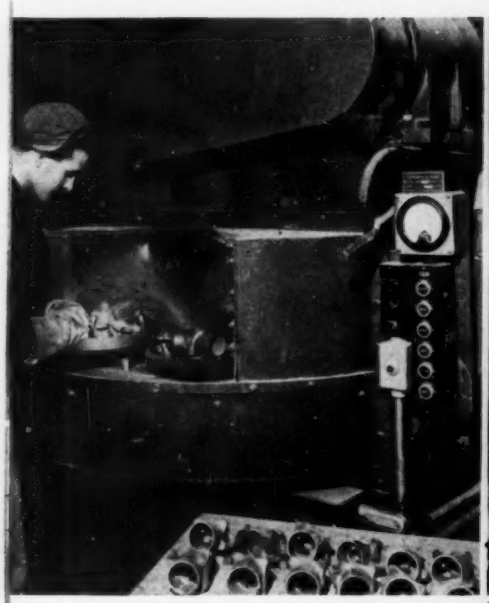
MULTI-USE TOOL—Although welding is a basic method of fabrication, it also has a definite and proper place with other conventional methods of constructing and repairing tools and fixtures. According to E. H. Girardot of GE's punching, tool and die division, many manhours and materials can be saved with this "tool" if properly applied. In rigging up a temporary step gage, commonly used for small lot irregular punch press work, for example, the setup is readily assembled in a few minutes from scrap strips of thin metal by setting the strips on top of one another with each edge the desired distance from the preceding edge, then spot welding them together. (p. 80)

VALENCE ELECTRONS—Although it now is well established through x-ray studies that plastic flow of metals can take place only on a limited number of crystal planes, and in specific crystallographic directions, much yet remains to be discovered, according to Norman P. Goss, consulting physicist, Cold Metal Products Co., Youngstown, O. This is true especially in regard to the nature of cohesive forces and their interaction, as slip proceeds in a crystal due to forces of deformation. This much is known, however, the electron shells supply the binding forces, and from more recent researches, it seems that cohesive forces are tied up with valence electrons. X-ray methods in the future should yield much additional information about the forces due to these valence electrons. (p. 98)



Precision Investment Castings

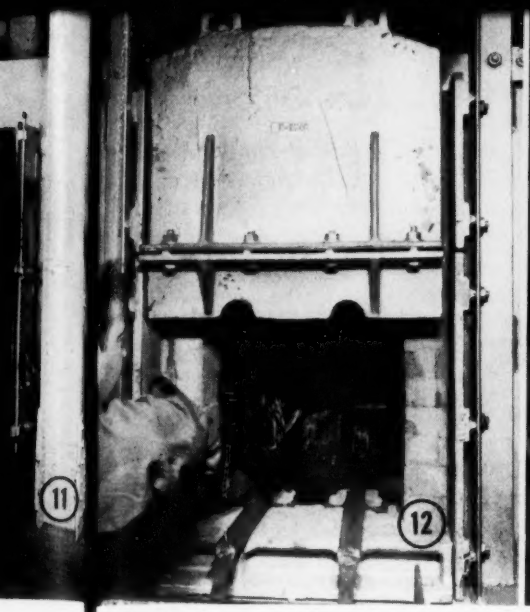
(10) *Here, excess investment material and paper above the top of the flask has been removed, as shown at left. Bottom of flask is at right.* (11) *Load of flasks is being placed in a baking oven where it will remain for 8 hours at 250° F to melt out wax which is caught in trays*



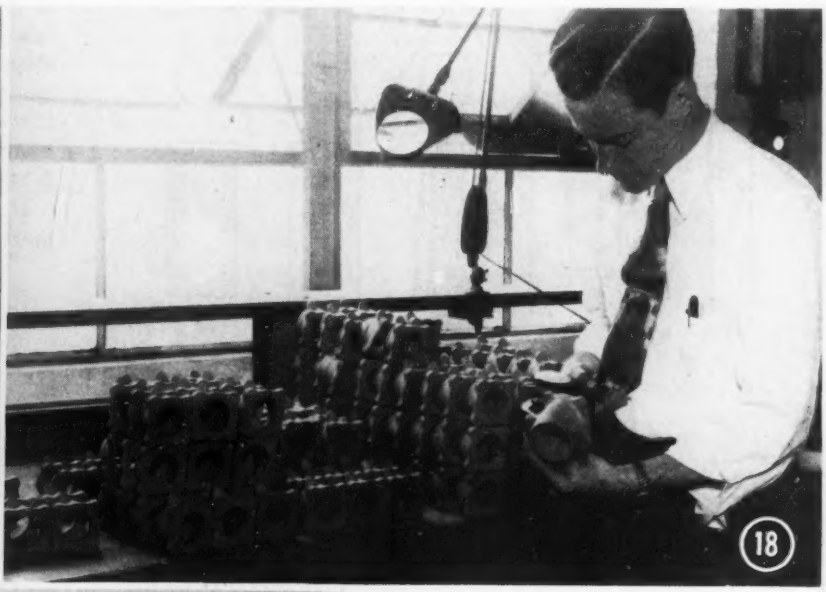
(14) *When cold, the castings are knocked out of the flasks with an air hammer and the last traces of investment are removed by this grit blasting machine*

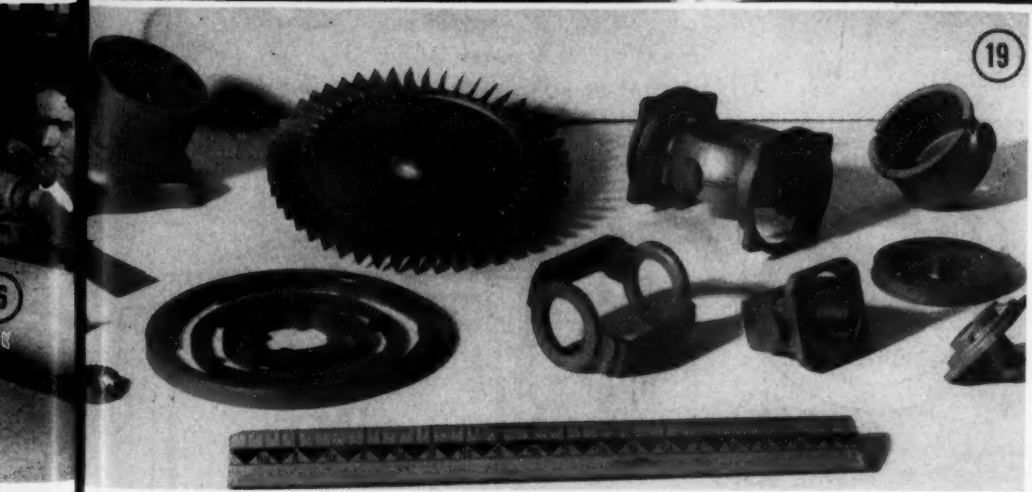
(15) *Sprues are removed from the castings by high speed cut off wheels and the remaining metal removed by grinding*

(16) *These operators are performing finish grinding on certain parts. Note exhaust system for removing metal particles*



and salvaged. (12) *On leaving the melt-out oven, the molds are heated in this furnace to remove last traces of wax and to bring them up to pouring temperatures ranging from* 1300° *to* 1800° *F.* (13) *International Nickel has six* 10-*lb and two* 4-*lb electric arc melting furnaces. The heated molds are clamped to the top of the furnaces, the furnaces turned upside down and metal forced into the mold cavities under air pressure up to* 10 *lb. In the background may be seen* 50 *and* 150-*lb induction furnaces for making gravity castings*





(17) *When required by specifications, parts are checked for sub-surface defects by x-ray*

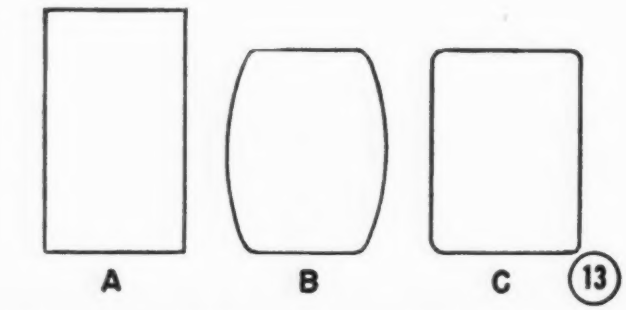
(18) *This inspector is checking wall diameters of an aircraft exhaust line coupler with a feeler gage*

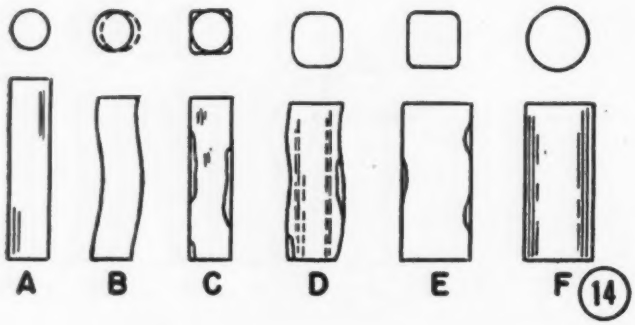
(19) *These are some of the parts of intricate shape produced by International Nickel. Sizes regularly produced range up to* 3 *or* 4 *lb but castings up to* 20 *lb can be made by a combination of precision and sand casting techniques*

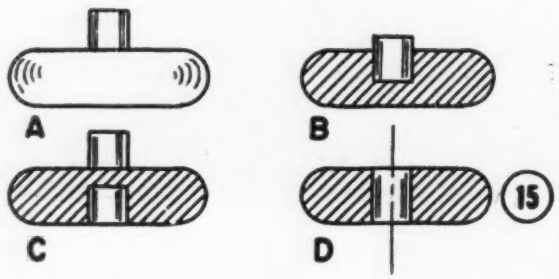
By WALDEMAR NAUJOKS

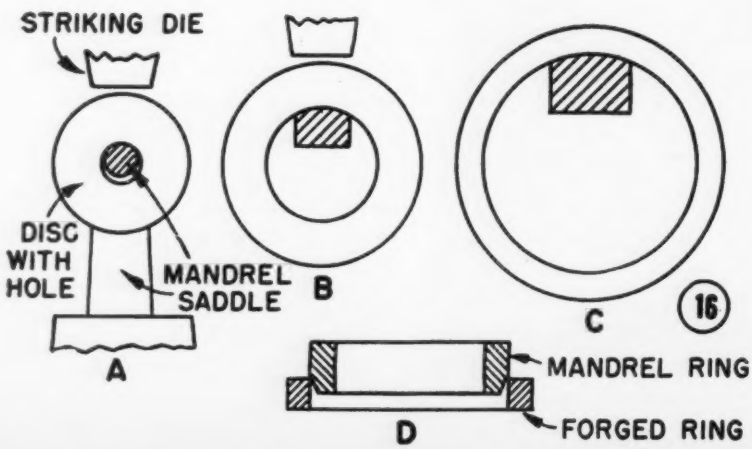
FUNDAMENTALS OF
Forging Practice

Part three of the current series continues review of forging methods, steps used in increasing the diameter or square of a bar, punching holes in flattened stock, forging rings and other smith and drop forging techniques









IN general smith forging work, it is necessary at times to increase the diameter or square of a bar. If the length of the bar to be increased in diameter or square is not longer than three times the dimension of the diameter or the thickness of the square, the piece can be upset to a larger size without difficulty. As the piece is being upset under the hammer, the sides will bulge out barrel-fashion.

The piece is then placed on its side and then upset some more, until it is larger than the size desired. It is then straightened out along the sides and drawn down to the dimensions required. Fig. 13 shows the steps in increasing the diameter or square of a short bar where the length is not more than three times the diameter. For example, if the diameter of the bar is 2 inches, the length should be not more than 6 inches.

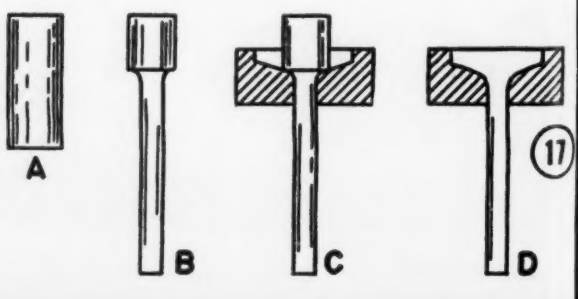
It is possible to upset a bar when the length is more than three times the diameter dimension, but

Fig. 13—Steps used in smith forging to increase diameter or square of a short bar where length is not more than three times the diameter. (A) Stock, (B) stock upset, (C) sides straightened

Fig. 14—Steps in upsetting a bar longer than three times its diameter. (A) Bar stock, (B) first upset, (C) straightened, (D) second upset, (E) straightened, (F) rounded up

Fig. 15—Steps in punching a hole. (A) Punch placed on disk, (B) punch driven in part way, (C) disk turned over and punch placed over hole, (D) resulting hole after punch is driven through

Fig. 16—Steps in making a weldless forged ring. (A) Start of ring forging, (B) blank after several turns over mandrel and larger mandrel in place,



not more than about five times or six times the length, by doing considerable extra work. Suppose a 2-inch diameter bar is about 10-inches long and it is desired to increase the diameter to 3-inches. The bar is upset a little but it begins to bend or buckle in the middle of the bar. It is straightened out and again upset a bit. Again it bends and must be straightened. The bar is worked in this manner until it has been upset sufficiently where it will not buckle.

In straightening the bar, it is hit on two sides 90 degrees apart, so that it becomes a square, for a square will not bend quite so easily as the round. After the bar is about 3-inches square, it is rounded up in the usual manner. Fig. 14 shows the steps in upsetting a length of bar longer than three times the diameter. It takes about five or six times as long to upset a long length than it does a short length because of the bending action.

In general forging work, the simple rule of metal flow is followed. Using the fuller, for example, flow of metal is easier in one direction than in the other, while if the dies are flat, the metal spreads out in all directions away from the center of the forging stock. If dies are curved concave in one direction, the metal moves more freely in the direction of the curve. If dies are convex, metal moves at right angles to the curve of the convex.

Next important operation in general smith forging work is punching holes in flattened stock. In hand work on the anvil, the punch is in the form of a hammer with a wooden handle. For the power hammer, or the general forging steam hammer, the punch is a short steel cylinder which is placed on the spot where the hole is required, by a pair of tongs. The punch is driven partially through the piece, then removed, and the forging turned over.

The forging has been somewhat dished by the first partial punching operation, and it is given a light flattening blow by the hammer. This flattening blow shows a clear outline of the hole pocket location on the underside, so the punch can be placed in position. The forging is given one or two more blows which cut away the center slug and bring out the hole. If the positioning of the punch has been done correctly, as it usually is after some experience, the hole is clean and without burrs. If the punching is done incorrectly, the hole will have a burr on two opposite sides. Fig. 15 shows steps in punching a hole.

Forged Ring—One of the important products of the smith forging hammer is the weldless forged ring. These rings are made by upsetting or flattening solid short lengths of billets, called slugs. The slug is upset to a disk to the thickness required. A hole is punched in the center of the disk, and the punched disk is placed over a mandrel in a saddling die and rolled over the mandrel to stretch out the metal to the ring size desired. First step of flattening the short slug is called "pancaking" because the upset disk resembles a pancake. A hole is punched in the pancake. Die on which the mandrel is placed has a long deep slot and is called the "saddling die." The forging is given a blow while it rests on the mandrel and is moved forward a little and given a second blow. This is continued so the ring stretches during the forging operation into a larger diameter. Forward motion of rolling causes most of the stock to stretch but some of it is spread to make the ring wider than the thickness of the original disk.

The ring is removed from the mandrel and placed on the flat part of the dies where it is given a series of flattening blows to bring the right width back to the ring. If the correct weight of slug has been used, the ring will have the right outside and inside diameters and the proper thickness. It requires skill to keep the ring a true round in the saddling operation. Where a true diameter is important, a steel ring whose outside diameter is the same size as the inside diameter of the ring being forged, is driven through the hot ring being forged. This operation sizes the inside diameter of the ring forging and assures a true roundness. Fig. 16 shows the several steps in making a weldless forged ring.

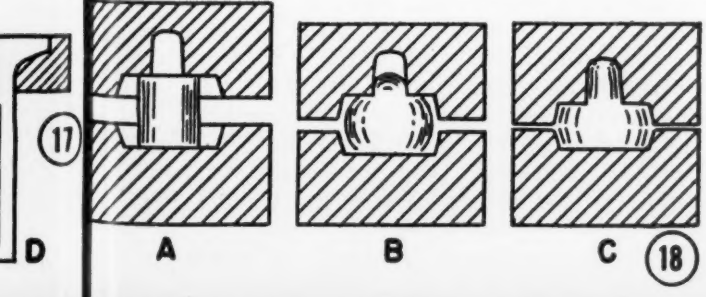
Several other types of smith forgings can be used to illustrate the methods used to move the plastic metal to desired shapes. Fig. 17 illustrates steps used in forging a valve blank for large oil engines. In this forging, the stock is upset at one end and drawn down for a length at the other end to develop the shape required. In all cases advantage is taken of the fact that metal moves in the line of least resistance.

In general smith forging work, it should be noticed that in making the forgings, the parts are made by working them down from forging stock which is large enough to make the largest diameter or section of the forging. Upsetting of stock, except in short lengths, is avoided wherever possible. This is done because it is relatively easy to work stock down from a large size to a small size, whereas the amount of stock that can be upset without difficulty is small. In forging connecting rod blanks, nut blanks, and similar parts, it is important to have the forging stock suf-

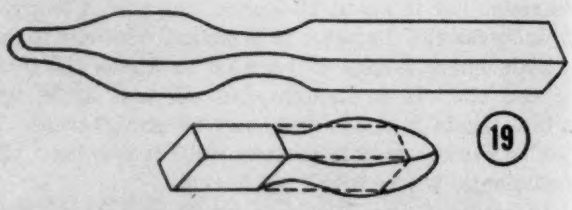
(C) part forged nearly to size, (D) sizing mandrel ring about to be driven through forged ring

Fig. 17—Forging a valve blank for large oil engine. (A) Cut length of round forging stock, (B) round stem forged out, (C) stem blank inserted in small die, (D) striking die of hammer forges stock for head into die cavity

Fig. 18—Movement of metal outward and upward during forging. (A) Blank forging stock placed in die ready for forging; (B) after several forging blows, metal moves mostly outward and very little into the small cavity upward; (C) when metal reaches sidewalls of die cavity, its spreading stops and it then moves to fill small cavity for the stem



B Bassett BET'R-GRIP BH BL



ficiently large so there is no need for upsetting. Only in special cases, such as in making valve blanks, is upsetting used in smith work, where the overall length of the part is considerable.

Drop Forgings—Drop forgings are forgings made in quantities in which the forgings are commercial duplicates of each other. This is made possible by the use of dies which are fastened into suitable hammer equipment. The dies contain the necessary forging steps and impressions for making the drop forging.

If a cylinder is placed in a die which has a diameter pocket, the metal will move in a spreading manner until it reaches the walls of the pocket. If the cylinder has a center hole in it, and the walls of the pocket in the die prevent the metal moving outward, the metal will move inward, if sufficient pressure is exerted.

Now suppose the cylinder is solid with a center hole but assume the top die has a small center hole in it. The metal will move outward as usual until it reaches the side walls where it is stopped in its spreading movement. If continued pressure is exerted, such as impact pressure by the forging hammer, the metal will tend to move up into the small center hole of the top die. In other words, the metal seeks to move somewhere and if the easiest path is stopped, it looks for the next easiest path, and so on. Reason for emphasizing the fact that metal will seek to move some place else if it cannot move in the direction it wishes to, is that design of drop dies is based on this fact. The importance will become more clear as the various steps in the making of die forgings are presented. Fig. 18 shows the movement of metal outward and then upward.

Drop Forging Dies—The set of dies in which drop forgings are made consists of two dies. One die is fastened to the bottom or anvil of the drop hammer. The top die is fastened to the ram of the drop hammer and is used for striking. Die faces which come together when forging, are machined hollow to the shape of the part that is to be a forging. Part of the shape is in one die and part of it is in the other die.

For example, if a forging is desired in the shape of a ball, the bottom die has a hole that is half of the ball and the top die is designed with a hole that is the other half. When the two dies are put together, they form a cavity which would make a ball if melted lead were poured into it. The pockets or cavities which are machined into the dies to form the shape of the forging, are called "impressions."

To those familiar with foundry practice, it is easy to picture the cavities in the casting molds and that the casting is made by pouring molten metal into them. Impressions in drop forging dies are of a similar nature. The difference is that the cavities, or impressions, in drop forging dies are machined in tough steel blocks, and that the plastic metal moves into the die pockets by forging pressure. The die impression must be divided between the top and the bottom dies of the set of drop forging dies. Wherever possible, the meeting faces of the dies are flat, and the forging is divided evenly between the top and the bottom dies. This is not always possible.

It is important, in making a drop forging, that the spreading metal should reach all parts of the sidewalls at the same time. If it does not, the metal may flow in the wrong direction and then return to cause a flaw in the forging. Since all shapes are not uniform, it may become necessary to do some preliminary shaping to the forging stock before it can be placed in the final or finishing impression. Several devices are used for giving the forging stock a preliminary shaping to get it ready for the finishing impression. Notice how these devices make use of the laws of metal movement to coax the metal to move where it is desired.

Edging Impression—The principal preliminary shaping device is termed the "edger" or the edging impression. This device is usually a shape just the opposite of the fuller. The edger has a concave surface in the top and bottom dies and its length is proportioned to suit the forging being made. It is seen that the edger prevents the metal from moving in the long direction and tends to increase the section area in the center of the edger, halfway between the front and the back of the edger ends.

The edging impression may be rather short in proportion to the diameter of the stock or it may be long in proportion. Usual procedure is to strike a blow of the forging stock, then to turn the stock a quarter turn and strike a second blow; turn the stock back a quarter turn and strike a third blow, and then to turn the stock a quarter turn for the fourth blow. The number of hammer blows in the edging impression depends on the amount of reduction and proportioning necessary. Fig 19 shows the working of the edger.

Fullering Impression—The fuller, or fullering impression serves a similar function to that given for the fuller in smith forging work. Its purpose is to reduce the size of stock between the ends of the forging stock, leaving the size or area at both ends larger than in the center. While the edger makes the ends smaller and the center larger, the fuller leaves the ends large and makes the center smaller. Fig. 20 illustrates the use of the fuller which is generally used together with the edger. In most cases where the fuller and the edger are employed the fuller is used first and the edger next.

Drawing as a preliminary shaping operation in drop forging work is used to reduce the size of stock at one end, without changing the size of the other end of the forging stock. Steps are similar to the drawing down operation used in smith forging.

Bending operation, or the bender, is usually a single blow step in which the stock, after being fullered and edged, is bent to a form that fits the finishing

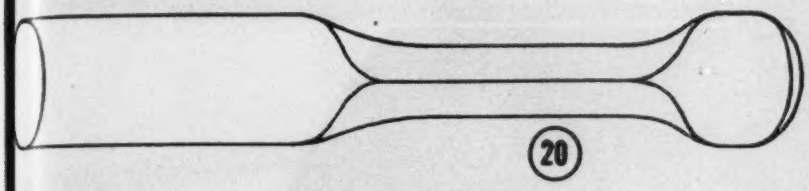


Fig. 19—Working the edger. As bar stock is struck successive blows, with the bar turned a quarter turn between each blow, metal is worked down to a smaller section area at the ends of the bar portion being edged, and middle portion enlarged

Fig. 20—Working the fuller—As bar stock is struck successive blows, with the bar turned a quarter turn between each blow, metal is worked down to a smaller section area in the middle portion of the bar section being forged; end portions remain unchanged

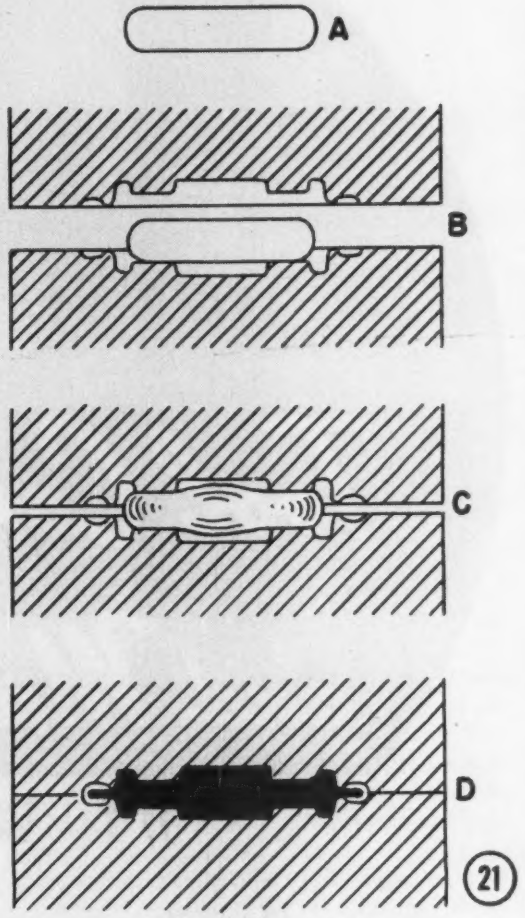


Fig. 21—Drop forging gear blank. (A) Length of bar stock flattened into a disk, (B) disk is placed in center of die impression; (C) after several hammer blows, disk spreads out to touch impression sidewalls. A small amount of metal works itself into the hub pockets, (D) after metal packs against the impression sidewalls, it flows to fill hub pockets and excess metal spills into gutters around perimeter of the impression parting line

Fig. 22—Die shift in a drop forging

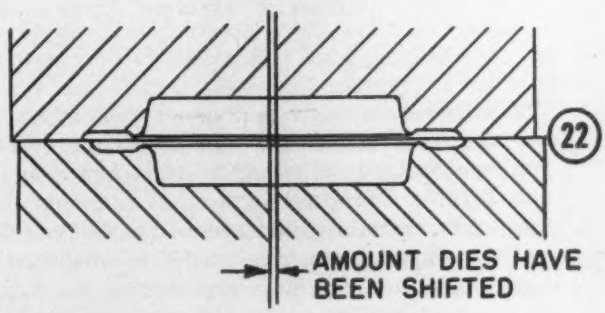
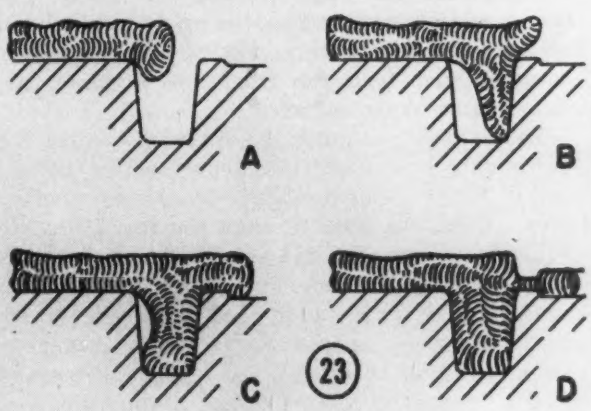


Fig. 23—Formation of a cold shut. (A) Metal moving towards impression sidewalls, moves outward. (B) Due to sharp impression corner, metal moves outward too fast to fill pocket, and outer edge of pocket fills first. (C) Metal reaches bottom of pocket and begins to work back to fill pocket; it tends to swing up against metal already in pocket. (D) Metal has turned up against itself to form cold shut in the forging



impression. It is necessary to keep the stock in straight alignment during the fullering and edging operations. The bending step forms the stock so that it is shaped to cover the finishing impression or the blocking semifinishing impression.

Simple, or single die impression forging, can be drop forged by placing the forging stock directly in the finishing impression. Fig. 21 sketches the shaping of the metal for a gear blank. Notice that the metal moves in a spreading outward direction until it is stopped by the sidewalls of the die impression. Only a small amount of metal spills over into the flash-pan, which is provided for the excess metal.

In drop forging practice, it is always necessary to have some excess stock to assure that the die impressions are filled up completely. Simple drop forgings require very little excess stock. More difficult forgings require a greater amount of excess stock. Shape of the forging being made determines the amount of flash required on the particular drop forging.

Wherever it is possible, all of the necessary forging steps are put into one set of dies. Sometimes it is necessary to use two or (*Please turn to Page* 104)

Tool Construction and Maintenance BY WELDING

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Manhours, materials and production delays can be saved by proper application of different types of welding in making and repairing tools, dies and fixtures

WELDING is a basic method of fabrication which has a definite and proper place with the other conventional methods of constructing and repairing tools and fixtures. Properly applied, it can help to save manhours, materials, and production delays. To assist in examining the relationship of welding in this field, a group of examples representing its scope will be reviewed and the applications discussed.

Flash-Butt and Butt Welding—A broken broach that would have caused serious production delay until replacement, is shown in Fig. 2. Delivery promise dates on such tools ran from 3 to 6 months at the time this breakage occurred.

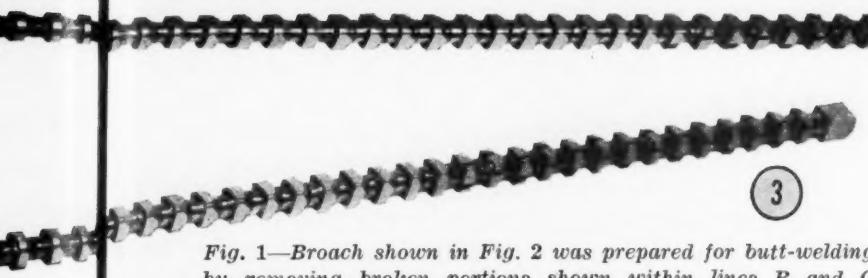
The broach was prepared for butt-welding by removing the broken portions shown within the lines B and C, Fig. 1. This provided square ends of the same area. Care was used to align the two pieces in the welder jaws so that the broach would be straight. After welding, before removing the broach from the machine a low heat was applied to the joint to relieve strain and guard against warpage and breakage. The same broach after welding and regrinding is shown in Fig. 3. Since one tooth was lost in the welding process, the next four were resized accordingly. Back in service within a day, it performed satisfactorily.

Butt-welding lends itself readily to the repair of bent drill shanks and broken tangs. Tangs can be repaired by the arc weld method, wherein the worn portion is "built-up" and remachined, although the results are not so satisfactory as with butt-welding.

Fig. 4 shows the preparation for repairing a drill tang. The portion up to line B is removed and a carbon tool steel plug of the same end area then is prepared.

Resistance (Spot) Welding—Minimum distortion is experienced from this method, since heat is applied to small areas only, with little effect on the surrounding metal. Its use, however, is largely limited to those applications not having definite strength requirements, in order to eliminate the necessity of physical tests on sample pieces.

Fig. 7 shows a positioning fixture used for locating a number of small parts on a base plate. The fixture consists of a $\frac{1}{8}$-inch thick cold rolled steel plate, angle iron sections which serve both as gages and stiffeners, small gage blocks and brackets with holding screws. Various pieces are located according to a layout on plate, clamped and spot welded. Low cost of fabrication makes it practical to build these fixtures for low production jobs, with a resultant saving



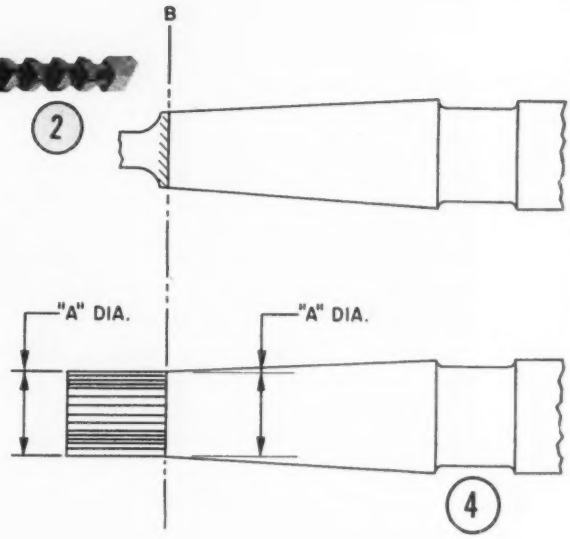


Fig. 1—Broach shown in Fig. 2 was prepared for butt-welding by removing broken portions shown within lines B and C
Fig. 2—Broken broach before welding
Fig. 3—Broach after reclamation by welding
Fig. 4—Preparation for repairing a drill tang. Portion up to line B is removed and a carbon tool steel plug of the same end area is prepared
Fig. 5—Chipped punch subsequently repaired by arc welding
Fig. 6—This welded drill jig weighs nearly a ton, is 7½-feet long and the cavity for accommodating the part to be drilled is 16 inches high and 18 inches deep.

in manhours in addition to improved uniformity of the product.

A temporary step gage commonly used for small lot, irregular punch press work is readily assembled in a few minutes from scrap strips of thin metal by setting the strips on top of one another with each edge the desired distance from the preceding edge, and then spot welding them together. In use, the gage is clamped to a standard back bar in such relationship to the die that a series of holes can be produced in part by locating from various steps on gage.

Oxyacetylene Welding—Gas welding finds many applications in the tool field, such as the "hard-surfacing" of jig feet, wear points on tools, etc., for instance, an embossing punch made from low carbon steel with the three projections added by building up with "hard-as-welded" filler metal. Since only the projections required hardening, the main body of the punch was readily machined to contour in considerably less time than would have been the case were the projections to have been machined integral and the entire punch made of tool steel.

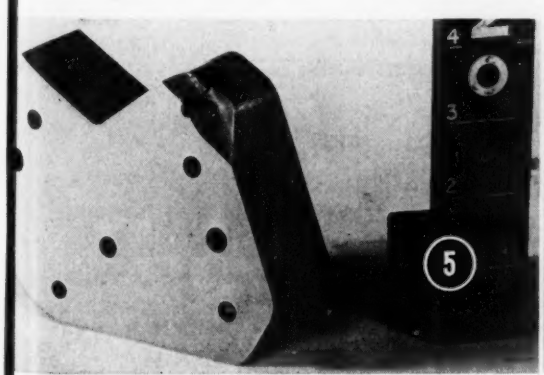
The punch was annealed after adding the projections, allowing them to be readily machined and blended in to suit the main punch body. A heat-treatment gave desired hardness to projections only.

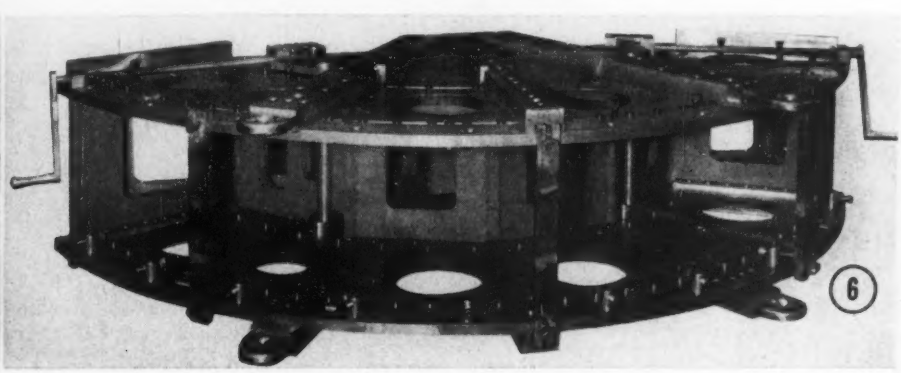
Arc Welding—The arc welding method is the most versatile and has the greatest field of application in both the repair and fabrication of tools. Broken and sheared punches, dies, shear blades etc., can be satisfactorily repaired by the use of "hard-as-welded" wire. It is extremely important, however, that the instructions issued by the manufacturers of hard surfacing electrodes and filler metal be rigidly followed.

A chipped punch repaired by this method is shown in Fig. 5. Preparation for welding consisted of grinding back the chipped portion to allow a minimum build-up of ⅛-inch of weld, as recommended by the electrode manufacturer. After preheating, a slow travel of the electrode was used, with mechanical peening after each pass to stretch the deposit and offset strain from the cooling metal.

Applications of "hard-as-welded" electrodes are not limited to the repair of cutting tools. Cutting, forming and drawing dies for low to medium production can be fabricated by the "composite" method. In other words, a mild, medium carbon or an SAE steel can be used as a base and a hard weld deposit applied for the cutting edges or wear points. This is also true of wear points in jigs and fixtures. Again, it is highly stressed that the electrode manufacturer's instructions should be followed to insure satisfactory results.

The arc welding process as applied to the fabrication of dies, jigs, fixtures, machine attachments and special equipment has brought about radical changes in both the method of their design and construction. Modern fabrication falls into two general categories. One may be considered as that class of work wherein machining or fitting work must be performed to





some or all of the parts by the toolmaker or diemaker prior to welding. The other class represents those fabrications which can be completely assembled by welding prior to any machining in the tool room.

Good judgment must be used in determining whether stress-relief heat-treatment after welding is essential. In the case of shops having a good volume of work necessitating stress-relieving, it is a relatively simple and inexpensive matter to perform this operation. In the event of shops having but small amounts of such work, it becomes more economical to omit this operation where possible.

Other Applications — Other applications include welding pieces or sections to existing tools to suit part revisions, adding guards and gages to tools and welding back-up blocks to support die or punch sections cutting heavy materials. Designs covering such work specify weld points and fillet sizes on assembly drawings, so that the tool or diemaker can have the welds made when he is ready for them.

The second group, wherein assemblies are completed and delivered to the tool room ready for machining, provide the more fertile field for reducing tool costs. The fabricated portion may be indicated on the tool drawing or, in the case of the more complicated assemblies, a separate detail drawing may be provided. In either case, instructions relative to fillet sizes, heat-treating, sand-blasting and painting are included. It is the function of the welding section to furnish the necessary torch-cut material or structural shapes and to deliver the completed part.

The box drill jig shown in Fig. 8 illustrates the radical departure from conventional design which can be effected by the arc welding method of fabrication. Strength and stability are maintained, yet total weight considerably reduced. The overall size of the jig is 12 x 12 x 8 inches. It consists of six pieces, two side members, torch-cut from ⅜ inch thick boiler plate, and two pieces of ½-inch pipe, one piece of angle iron and one piece of bar stock all cut to length by a metal saw.

A "layout" man tack-welded the various pieces in position and a welder completed the fabrication. A heat-treatment, followed by sand-blasting, prepared the assembly for the tool room. Machining consisted of squaring the four edges of the side plates, cutting a locating slot on the inside face and edge of the lower cross-member plate and adding bushings and clamps. Due to the small amount and location of the machining, no objectionable distortion was anticipated, nor experienced.

Tool Design—Capacity of available tool room equipment should be considered when planning the design of tools fabricated by welding. For example, the drill jig shown in Fig. 6 weighs nearly a ton. It is 7½-feet long, and the cavity for accommodating the part to be drilled is 16 inches high and 18 inches deep. The part requirement necessitated the building of a sturdy, permanent jig capable of locating a total of 118 holes, 59 per side. All holes were to be held within a tolerance of ±0.003-inch, and holes on opposite sides were to be in line within same tolerance.

At first consideration, this jig presented interesting possibilities as a completely welded fabrication. Subsequent investigation indicated definite disadvantages in a complete fabrication, which were:

1—Jig-boring of the drill bushing holes on available tool room equipment would not have been practical, due to the large size and extreme weight of the assembly. Two set-ups per side would have been required, and it was felt that the weight of the assembly would severely strain the Jig-borer and affect its accuracy.
2—Use of the jig-boring method would require individual set-ups for each side of the jig, with possible resultant errors in that the holes might not be directly in line within the tolerance of ±0.003-inch.
3—Size of the jig would have required a difficult and slow operation in order to machine the locating pads, etc.
4—Time consumed in heat-treating and rough machining the fabricated assembly, then a second heat-treatment and finish machining to insure against subsequent distortion would have been prohibitive, in view of the required completion date.

Due to these disadvantages, it was decided to combine welding with the conventional method of assembly. The side plates were torch-cut, including the lightening holes, then stress relieved prior to turning both faces and the outside contour. The bushing holes were drilled and reamed in a radial drill press, rather than to overload the jig borer.

To facilitate location of the holes, two slots, ⅛-inch deep by a width equal to the outside diameter of the drill bushings, were turned in the face of one plate as shown. The plates were then doweled together and a cut taken to clean up the bottom edges and a section on one end to act as set-up surfaces for assembly. Toolmakers buttons and a drill template were used to locate and machine the holes. Since

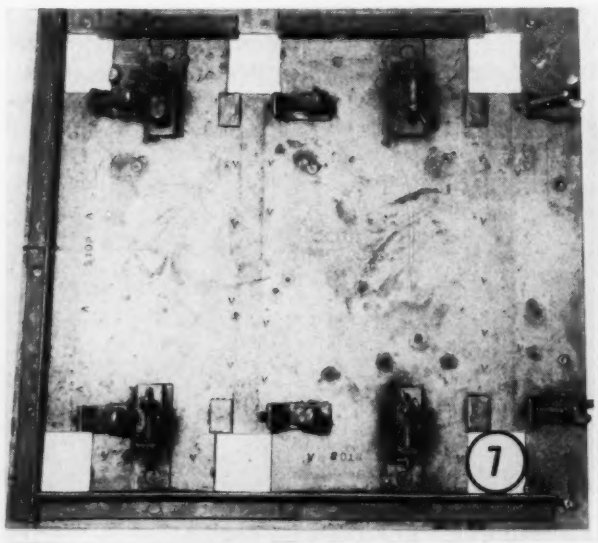


Fig. 7 — Welding fixture fabricated by resistance welding

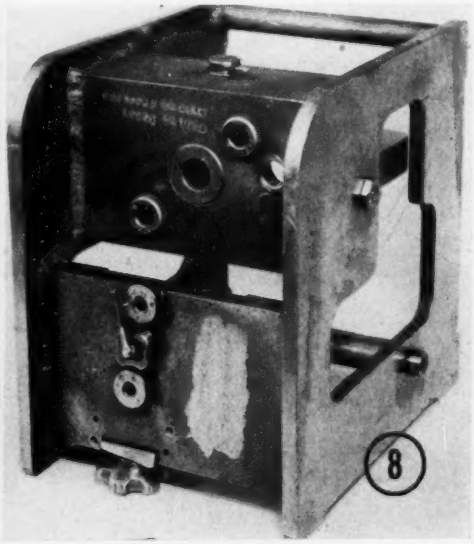
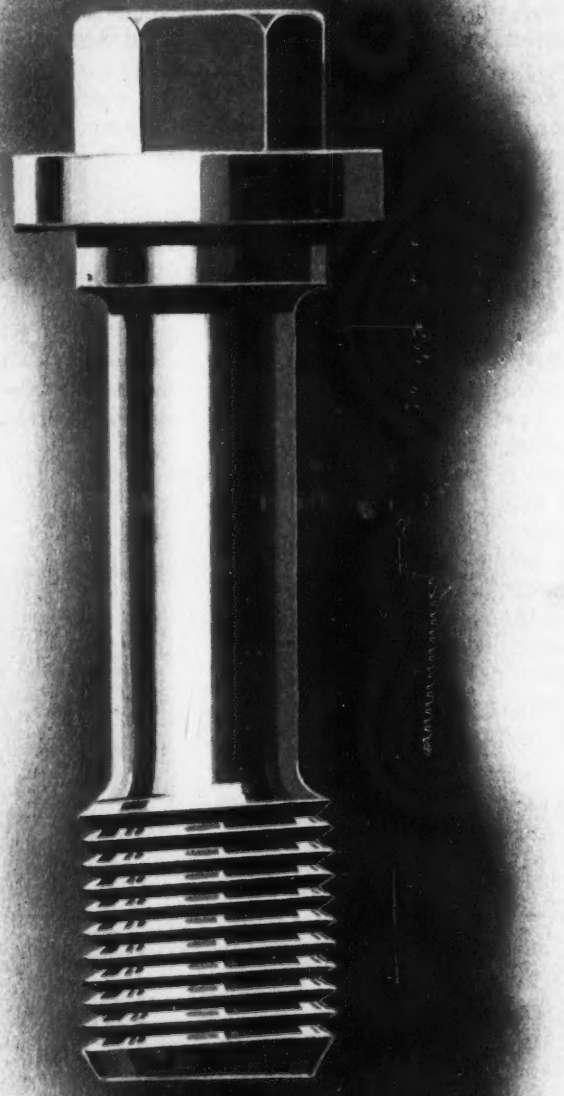


Fig. 8—Box drill jig fabricated by arc welding

CHANDLER

cold wrought engineering products



they do the job well because they are well made . . . . . .

CHANDLER PRODUCTS CORP.

1491 CHARDON RD. CLEVELAND 17, OHIO

the buttons were of the same outside diameter as the drill bushings, the radius was automatically set by placing them in the slots. Proper angular spacing was established by taking chordal measurements. Final inspection showed every hole located within +0.0015-inch, or one half the allowed tolerance.

Rest plates and parallels were assembled with screws, since welding them might have caused undesirable warpage. In this manner, only the spacing spider between the side plates was assembled by welding. It will be noted that welded fabrications can be given a very pleasing appearance. A coat of paint was applied after heat-treatment and sand-blasting, and before machining the top and bottom surfaces.

The indexing milling fixture shown in Fig. 10 is an application wherein continued extreme accuracy relative to warpage and distortion is essential. Both the base angle plate and that on the indexing member are fabricated by arc-welding from torch-cut boiler plate. The overall size of the fixture is 6¾-inches wide by 9 inches long by 8 inches high.

No Special Preparation—No special preparation for welding was required, since the light scale on the boiler plate and the flame-cut edges of the pieces were not objectionable. A stress-relief heat-treatment was given after welding and a second heat-treatment given after rough machining.

This stress-relief heat-treatment is the same each time, consisting of heating the welded fabrications slowly to 600 to 650° C, holding at temperature 1 hour for each inch of thickness. Cool at a rate of 50° C per hour to 100° C, when the part may be removed.

Another point is the small amount of finish machining, which includes only the bottom surface of the base angle plate, the keys, and the top front portion of the upright plate, with the bored holes for the center bearing and index pin bushing. The indexing member is machined on the rear face and along a portion of the front face and inside angle, including the bored holes for the shaft and index pin bushing. This method of shaft and bearing assembly permits ready adjustment for end play, since it is only necessary to remove the desired amount from the end of the shaft.

Welded fabrications find broad application in the construction of special machine attachments. Fig. 9 shows a rear center view of a standard lathe provided with attachments converting it into a semiautomatic machine for trimming rectangular drawn boxes. The welded assemblies as seen in this photo include the horizontal holding bracket for the trimming roll; the air tank, the vertical holding bracket for the scrap cutter roll; the scrap roll support and the adjustable slide and holder for the air cylinder and toggle which actuates the scrap roll cutter.

All these parts were fabricated by arc-welding from torch-cut boiler plate. Heat-treatment, sand-blasting and painting preceded the machining operations. An additional heat-treatment prior to finish machining was not considered as essential in this application, and was omitted.

From data presented by the author at the semiannual meeting, ASTE, Boston, Nov. 1, 1947.

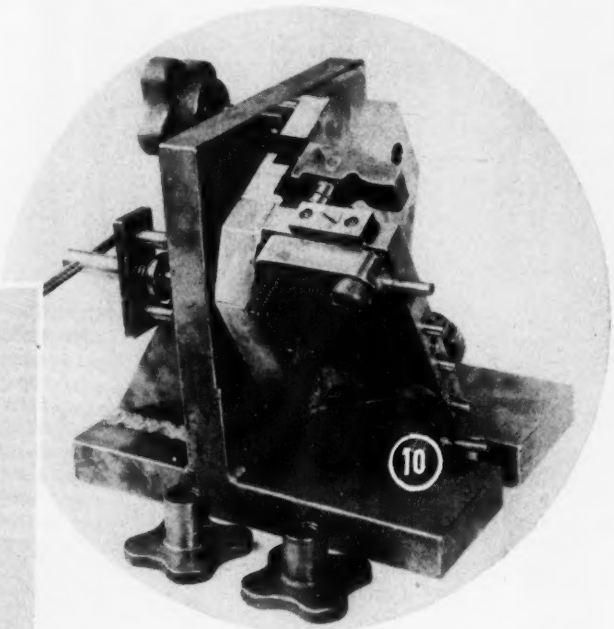


Fig. 9—Adapter, trimming and scrap cutter rolls mounted on lathe for trimming rectangular drawn parts

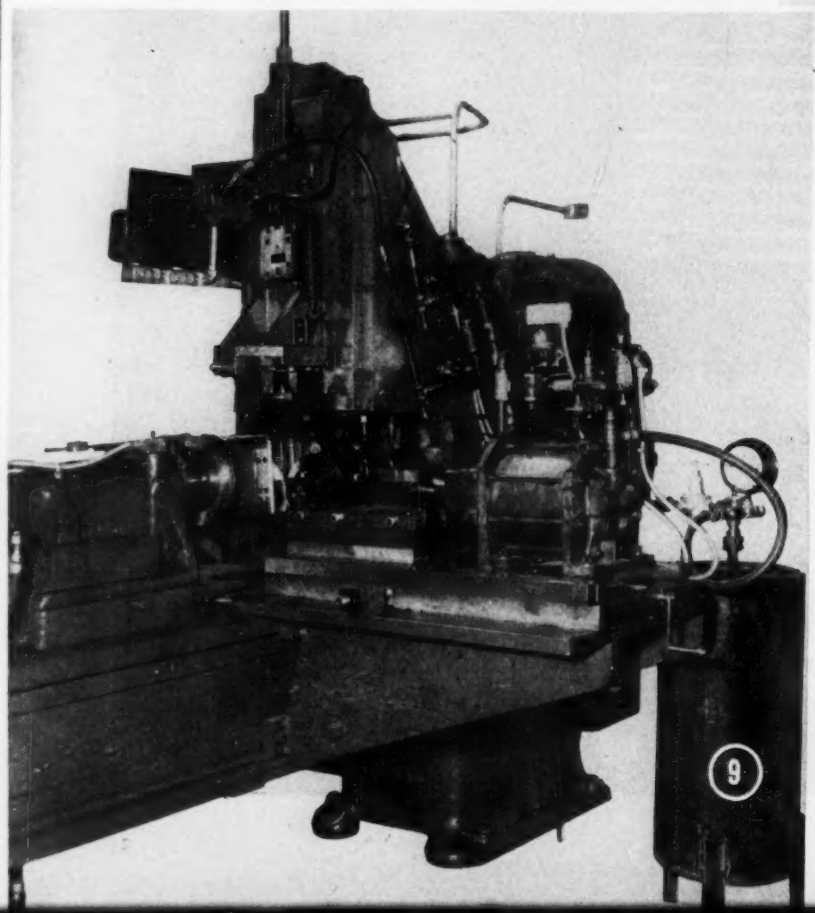


Fig. 10—Index-mill fixture fabricated by arc welding method

Idea that raises the roof

Trouble with the old convertibles was their tug-of-war tops. But that headache's over now.

New push-button tops mean wonderful convenience for the buyer . . . new sales horizons for the maker.

And as engineers worked out this mechanical magic, they almost automatically turned to double-walled Bundyweld* Tubing. *They* knew from experience that thoroughly reliable Bundyweld would stand up under the vibration and constant usage of raising and lowering the roof.

Whatever *you* make, from cars to clocks to coffee pots, chances are Bundy Tubing can help you put over an idea, too. *For you'd be amazed at where you can use Bundy Tubing!* Just look at the range of applications in even these few uses and ideas at the right.

BUNDY TUBING

ENGINEERED TO YOUR EXPECTATIONS ®

*Reg. U.S. Pat. Off.

6 Most of today's topmost Bundy Tubing applications began with a simple idea. We were asked, "Can it be done?" and Bundy engineers got busy, helped show how. We're ready to try the same for you, regardless of what your plans may be. Better investigate now. Call or write *Bundy Tubing Company, Detroit 14, Michigan.*

WHY BUNDYWELD IS BETTER TUBING

Bundyweld Tubing, made by a patented process, is entirely different from any other tubing. It starts as a single strip of basic metal, coated with a bonding metal.

This strip is continuously rolled twice laterally into tubular form. Walls of uniform thickness and concentricity are assured by close-tolerance, cold-rolled strip.

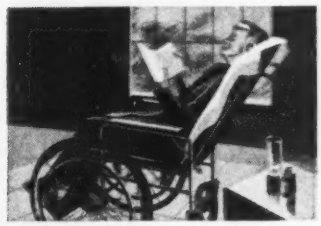
Next, a heating process fuses bonding metal to basic metal. Cooled, the double walls have become a strong, ductile tube, free from scale, held to close dimensions.

Bundyweld comes in standard sizes, up to ⅝" O.D., in steel (copper or tin coated), Monel or nickel. Special sizes can be furnished to meet your requirements.

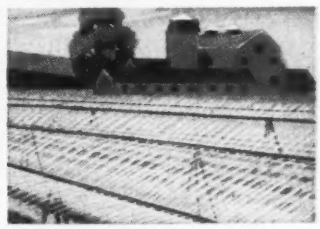
Bundy Tubing Distributors and Representatives: *Cambridge 42, Massachusetts:* Austin-Hastings Co., Inc., 226 Binney St. • *Chattanooga 2, Tennessee:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • *Chicago 32, Illinois:* Lapham-Hickey Co., 3333 W. 47th Place *Philadelphia 3, Pennsylvania:* Rutan & Co., 404 Architects Bldg. • *San Francisco 10, California:* Pacific Metals Co., Ltd., 3100 19th St. • *Seattle 4, Washington:* Eagle Metals Co., 3628 E. Marginal Way. • *Toronto 5, Ontario, Canada:* Alloy Metal Sales, Ltd., 881 Bay St. **Bundyweld nickel and Monel tubing is sold by International Nickel Company distributors in all principal cities.**

1 What a powerhouse! And she can stop on a dime! For hydraulic brake-line systems in most of today's trucks and cars are Bundyweld steel tubing. Bundy is double-walled from a single strip!

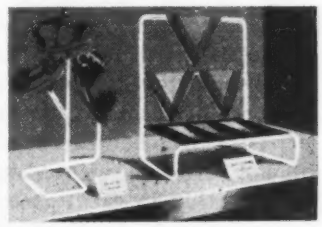
2 An air-conditioning expert thought of Bundy, too, for condensers, refrigerant lines and other tubing parts. Bundy worked like a charm; lowered costs, improved the units large and small. In short, it paid off.



3 Bundy's been used in wheel-chair hand wheels, hospital and photographic equipment . . . all kinds of surprising places. Bundyweld is thinner-walled with close tolerances, easily fabricated and *rugged*. As for new ideas—



4 Why not make overhead irrigation systems from weather-resistant Bundyweld? A whole new market could be tapped by this one. Machineable, ductile and lightweight, Bundy is applicable almost anywhere you look.



5 Or how about display-stand frames for millinery? Bend it, form it, join it, Bundyweld stands the gaff in hot spots or cold. No other tubing is double-walled from a single strip. Available in steel, Monel, or nickel.

Seen and Heard in the

Machinery Field

By GUY HUBBARD
Machine Tool Editor

STRATOVISION: As would be true of anyone from Vermont, I got a lot of satisfaction out of being able to see and hear some of the doings at the Republican National Convention in Philadelphia. I saw and heard those doings as they took place. I saw and heard them by television and FM radio in a private dining room of the Statler Hotel in Cleveland, as a guest of Westinghouse Electric Corp. and Glenn L. Martin Co., through the medium of their co-operative development known as "Stratovision".

This system is the brain-child of a 30 year old, Texas-born Westinghouse radar expert named Charles Edward Nobles. In 1944, on a flight from Mexico City to Baltimore, he conceived the idea that the effective range of television and FM radio could be extended greatly by rebroadcasting from specially equipped planes circling around in the stratosphere.

Mr. Nobles interested Westinghouse in his dream and Westinghouse in turn interested Glenn L. Martin in it. And the result was that on the evening of June 23, 1948, the group of which I was one looked in on —and listened to—the Republican National Convention from Cleveland, through the medium of a specially built and specially equipped "flying rebroadcasting station" which in the meantime was circling over the Pittsburgh-Morgantown area at a height of 25,000 feet.

When an inventive mind like that of Charles Nobles gets linked to the vast experimental and manufacturing facilities of organizations such as those of Westinghouse and Glenn L. Martin, the "impossibilities" of things like television and FM radio are removed—to the benefit of all of us. There you have a wonderful example of American technical co-operation under our system of free enterprise. It was indeed fitting that our first glimpse through Stratovision was of our time-tried political system in action.

1948 METALWORKING: In the course of all the plant visitations which I made during the week of the ASME meeting in Milwaukee, I was strengthened in my conviction that with materials continuing scarce and cost of machining remaining high, a strong effort is being made throughout industry to reduce the amount of metal removed in the form of chips.

I saw this in great metal forming plants such as that of the A. O. Smith Corp., I saw it in great foundries such as that operated by the Falk Corp. I saw it in the kind of machining which companies such as Kearney & Trecker are designing their latest machines to do.

Can it be possible that the current shortage of scrap is due in substantial degree to the fact that the ratio of scrap to finished parts is being cut to the bone? There is something to think about.

TRUNDLE TALKS: One of my favorite industrial philosophers is George T. Trundle Jr., president, Trundle Engineering Co., Cleveland. Throughout the many years that I have known him, he has been putting his philosophy into action as a consultant in management, merchandising, manufacturing, engineering and industrial relations.

In the June 1948 issue of his vestpocket publication *Trundle Talks,* he philosophizes thusly: "Industry keeps talking about what's *wrong* with Communism and State Socialism, instead of proclaiming what's *right* about profits.

"Where do the plants come from in which people work? They come from saved-up profits. Where does the money come from to finance inventions like autos, airplanes, and radios? It comes from saved-up profits.

"Under our competitive system, what companies make profits over the long run? Those that succeed in offering more people better things at lower cost. In a company that makes money, people *keep* jobs; in a company that loses money, people lose jobs. Profit is the basic key to steady work and a higher standard of living. That's the hub of our whole 'free enterprise' system.

"Only when man's genius for profit went into partnership with engineering—in research, invention and manufacture—were men and materials, the raw stuff of nature, converted into Civilization."

DETROIT—MACHINE TOOL TOWN: I am writing the copy for this page on the eve of taking off on one of my increasingly frequent visits to that place in Michigan which is so generally recognized as a great automobile building town but which is so little recognized as a great machine tool building town.

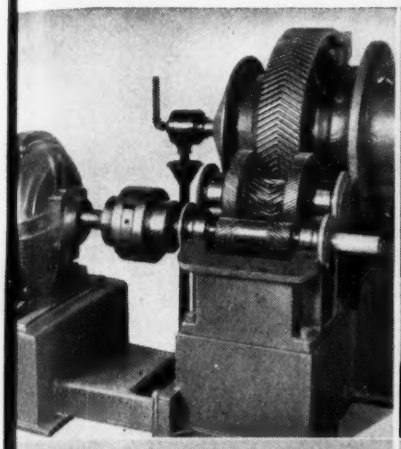
How many people realize that Detroit now has 14 member companies in the National Machine Tool Builders' Association, being "topped" in that respect only by Cincinnati with 19, and approached closely only by Cleveland with 13?

Machine tool men and practical tool engineers like Henry M. Leland, the Dodge brothers and Walter Chrysler had a lot to do with the upbuilding of the automobile industry but their excellence as "machinists" has been overshadowed by their fame as motor car builders. Many of their contemporaries and successors, however, have stuck to machine tools and toolmaking. Now—in their less spectacular way—they have achieved success which adds up to the equal of anything in any of the so-called "newer machine tool centers".

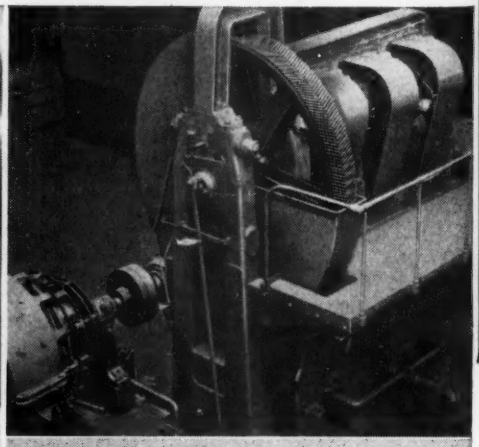
While some of these companies—as might be expected—specialize in the designing and building of special purpose machines for the automobile industry, a goodly number of them manufacture standard machines the usefulness of which extends far beyond the automobile industry.

Whenever you need gears—think first of

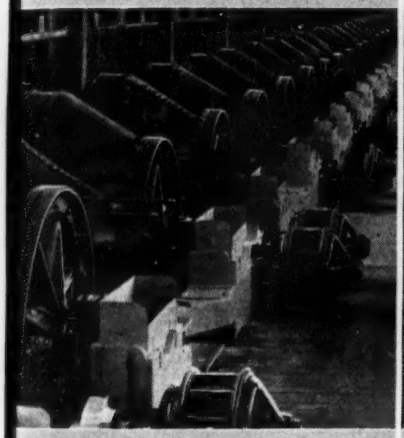
FALK GEARS



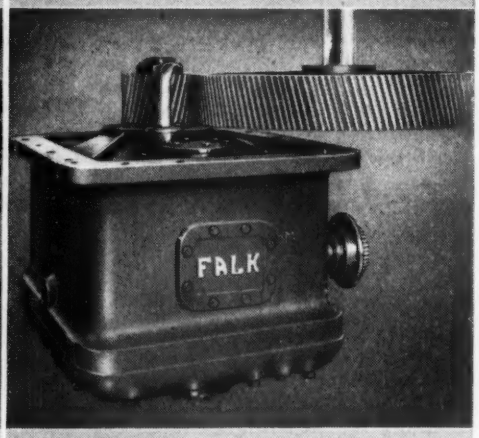
Standard Falk Speed Reducer gears, pinions and bearings give added efficiency to the operation of this tuber machine in a rubber mill.



Falk herringbone gears drive one of the largest vertical triplex pumps in the country. These gears have 24/266 teeth—3 DP—12" face.



Battery of Ball Mills in copper mine using Falk gears. These gears have been in use over 20 years—requiring no replacement.



Special Falk Right Angle Drive with external Falk single helical low speed gears to drive sand mixer. 35/143 teeth—4.46 DP—5" face.

precision-made for dependable performance

Behind the excellent reputation of FALK gears stands a 55-year record of continuous metallurgical and technical research . . . development of engineering skills which are not only **proved** but constantly **improved** . . . and special manufacturing processes which produce precision gears for long, trouble-free service.

FALK gears are employed by manufacturers and machinery users . . . for initial installation and for changes in the field . . . in factories, mills, mines, in fact wherever power is being transmitted. Many FALK gears installed more than a score of years ago are giving splendid satisfaction in service today.

We keep on hand a large selection of gear patterns to save you time and expense in ordering gears for many applications. Also, we are equipped to fill your needs for special-type gears of whatever size or design you may require. It always pays to "think **first** of FALK gears," and then consult FALK. It's more than ever "a good name in industry."

Check your needs...

Stock gears	Herringbone gears
Heavy duty gears	Small gears
Large gears	Gears for mines and mills
Mill pinions	Ring gears
Single helical gears	Special gears

Falk makes them all!

THE FALK CORPORATION, Milwaukee 8 Wisconsin
Established 1892

Precision manufacturers of Speed Reducers . . . Flexible Couplings . . . Motoreducers . . . Herringbone and Single Helical Gears . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Steel Castings . . . Contract Welding and Machine Work. District Offices, Representatives, or Distributors in principal cities.

FALK ... a good name in industry

LETTERS *to the Editors...*

Faulty Loading

In the April 5 issue of your publication there appeared an abstract on faulty loading practices being the cause for many container damages.

There was no mention in this article as to the type of containers damaged—whether wooden, paper, or otherwise. If you have this information available, or a copy of the study made by the Shipping Container Institute, we would appreciate your forwarding this data.

A. J. Liebman, Research Engineer
Dravo Corp.
Pittsburgh, Pa.

The damage referred to was to paper containers. Additional information appears on page 91 of the April 19 issue of STEEL. It deals with failure to block doorways of freightcars and weak or insufficient bracing. You may get further information from the institute, 475 Fifth Ave., New York 17, N. Y. —The Editors.

Location New York

In the May 3 issue of STEEL, there was an article referring to "Synthetic Chemical Acts As Corrosion Inhibitor". You mentioned that this material was recently developed by Charles Stevens & Co. of New York.

We have been unable to locate the address of the company and since we are interested in obtaining additional information, we would appreciate your giving us the address.

L. F. Bartels
Mosler Safe Co.
Hamilton, O.

Address of Charles Stevens & Co. is 2018-24 Crotona Parkway, New York, N. Y.—The Editors.

Fret No More

Please send me tear sheets on the following articles: "Fretting Corrosion—How To Eliminate It" and "Life of Ladle and Spout Linings Increased". These appear in the April 5 issue of STEEL.

K. G. Presser, Chief Metallurgist
National Supply Co.
Superior Engine Division
Springfield, O.

Safety First

Mr. Glenn L. Martin, President
Glenn L. Martin Co.
Baltimore 3, Md.

Dear Sir:

We were very much interested to see the "Improvement in Method of Performing Notching Operations on a Punch Press" at your plant, as shown on page 116 of the April 26 issue of STEEL magazine. Such examples and illustrations are a real stimulation to other companies to provide press guarding.

We were particularly interested because of the recent approval of the revised American Standard Safety Code for Power Presses and Foot and Hand Presses, B11.1-1948. In the thought that this document may be of interest to you and your work in press guarding, we are enclosing a complimentary copy.

Henry G. Lamb, Safety Engineer
American Standards Association
New York, N. Y.

The above is a copy of a letter sent to Mr. Martin. We are glad to have had a part in publicizing such production techniques and safety measures.—The Editors.

That Big Battleship

Your issue of May 3rd, page 110, prints a letter to the editor over the signature of Walter Siegerist, president, Medart Co., St. Louis, Mo. He bemoans the fact that ". . . we read about our Navy taking a 300,000 ton battleship and scuttling it". If the 300,000 had appeared in the letter only once, I would have taken it as a slip of pen or type, but it appears three times, so I assume the author really means a 300,000 ton battleship.

I was under the impression, Mr. Editor, that cruisers were of slightly less tonnage, say about 290,000 tons. Either Mr. Siegerist is wrong or Uncle Joe had better smile when he calls us all those pet names. Will you kindly set us straight?

Daniel N. Ball
Pico, California

Ships like the Pennsylvania referred to by Mr. Siegerist are only 30,000 tons (four 0's). Cruisers run from about 5000 to about 15,000 tons. Our largest battlewagons of the Missouri class are between 45,000 and 52,000 tons, according to the ex-Navy members of our staff. It is our opinion that even with the measly 52,000 tonners, Uncle Joe is smiling.—The Editors.

"Basic" Left Out

We are pleased that you have carried a brief story of the radioactive-sulphur tracer experiment which we recently completed for Republic Steel. However, referring to our suggestion that radioactive phosphorus be used for controlling the Bessemer, we wish to apologize for leaving the word "basic" out of the story which appeared in our Industrial Bulletin.

Already we have received several letters telling us phosphorus is not removed in the acid Bessemer as employed in the United States. This is correct, but phosphorus is removed in the basic Bessemer process as utilized in Europe and it was to this practice that our example referred. It might be added that the basic Bessemer process is an excellent steelmaking process.

We hope this omission does not force you to write too many explanatory letters.

B. S. Old
Arthur D. Little Inc.
Cambridge, Mass.

Data Sheet Info

May we have permission to use freely sections of the article entitled, "How To Select Quenching and Tempering Oils for Treating Steels", by E. L. H. Bastian, which appeared in the March 22 and 29 issues of STEEL. Complete recognition will be given to the author and to your publication.

The sections will be put together to form a Lefax data sheet. Large drawings will be printed on double sheets.

M. H. Edison
Lefax Loose Leaf Technical Data Sheets
Philadelphia, Pa.

Permission is granted for you to use any portion or portions of the article under the conditions of your letter.—The Editors.

Who Sponsored It?

In the May 3 issue of STEEL, on page 72, there is a short article about a film entitled "Naval Photography in Science" which was prepared under the supervision of Lt. Commander W. R. Cronenwett. We are interested in learning exactly what unit of the Navy sponsored this film—was it Bureau of Ordnance, Bureau of Air, Bureau of Ships, etc.

J. M. Gruitch, Director of Research and Development
American Car & Foundry Co.
New York, N. Y.

We are unable to determine exactly what unit of the Navy sponsored the film. As we understand it, it was prepared by the motion picture section of the Office of Public Relations, Division of Public Information, Navy Department, Room 0130, Main Navy Building, Washington 25, D. C. It is quite possible all three bureaus collaborated with the Bureau of Public Information.—The Editors.

Ceramic Steel Coatings

We shall appreciate your advising us to whom we can write to obtain more information relative to the manufacturer, availability, etc., of the "Ceramic Coatings for Steel", referred to in your article on page 104 of the May 24, 1948 issue of STEEL.

Walter H. Kelley Jr.
Stearns-Roger Mfg. Co.
Denver, Colo.

Further information may be secured from National Bureau of Standards, Washington 25, D. C. It is contained in Technical Report 1183, a paper presented at the Symposium on Model Metal Protection. Additional information is in National Bureau of Standards Report 38, 293 (1947) RP1773.—The Editors.

Fig. 1—Heated billets are transferred from furnace to forging press by means of monorail tongs

Assembly-Line Machining

...used to produce rock bits for petroleum industry

Improved forging practice and die design reduce scrap costs and increase die life. Modern handling methods and specialized holding fixtures help Hughes Tool attain high level of output

By GERALD ELDRIDGE STEDMAN

SPECIALIZED machining, heat treating and forging techniques are used by Hughes Tool Co., Houston, Texas, to produce rock bits for the petroleum industry. Changes are constantly being made to improve quality of the product and to increase output.

Since most part production in the plant originates with forgings, this practice has received unusual technical attention lately with the result that scrap costs have decreased 50 per cent, die life has increased from 50 to 300 per cent and forging billet size has decreased 10 per cent. Biggest factors in these savings have been redesign of forging dies and punches and improved applications of forging presses.

Magnetic lift trucks move raw forgings from a large outside binned area to Pangborn rotary shotblast and then to furnace which serves forging machines of 1000, 1300, 1600 and 2500 ton capacities. Also included in the forging shop are 7 and 8-inch upsetters and batteries of forging hammers.

High Speed Press—As many as 250 forgings per hour are turned out on the 2500-ton forging machine using up to 54-pound billets. Its bolster uses three progressive dies to block, break down and finish. Die design no longer uses water, eliminates kicker pins, is arranged to require minimum work and metal and produces less scrap than formerly. Each die receives a minimum of 16 reworks. Compared to a former maximum of 7000, the forge shop has accomplished 28,000 impressions on one set of dies recently.

All steels are alloyed to Hughes analyses and are heated to forging temperatures ranging between 2250 and 2400° F in a Holcroft rotary furnace. Work comes to furnace by monorail tongs, Fig. 1, goes by conveyor to a 200-ton Bliss trimming press. From the press it goes by chute to an escalator conveyor and finally to a wagon. The 1000-ton press is also exceptionally fast having a capacity of 450 pieces per hour.

Three Section Bit—The Hughes rock bit, called the Tricone, consists of three sections which hold cones having milled teeth that act as cutters. Each of these has its own production line so that there is three-line routing. Varied machining operations incorporate much original tooling, special machine detail and holding fixture design. Carbide cutters are used wherever possible including many with negative rake.

Forged and annealed, cones come to a Gisholt No. 12 turret lathe which faces the cone and turns the chucking groove. This is done at 190 revolutions per minute with 0.015-inch back and 0.020-inch front feed, with a planned time of 2.17 man and machine hours per 100 pieces. Then

the roller race is semi-finished, and tapped with Landis collapsible taps in order to hold work in the following operations. This is accomplished on an 8-inch Acme Gridley automatic, using individual checking on the six spindles and turning at 98 revolutions per minute with a 0.0025 to 0.013-inch feed with a planned time of 2.13 man-machine hours per 100 pieces.

Work then comes to a No. 12 Gisholt turret lathe for rough and finish turning. Here outside diameter is turned on the cone, at a variable speed from 90 to 790 revolutions per minute to maintain uniform surface speed. Production is 48 pieces per hour. Cone is then grooved on a Gisholt Simplimatic which provides for the necessary rows of "blanks" in which teeth are subsequently cut. Limits here are plus or minus 0.005-inch and a ¼-degree angle is involved. Speed is 284 revolutions per minute with a 0.005-inch feed. Carbide tipped tools and gang tool holders with preset magazines are used front and back. Production on the Simplimatic is 1.88 man-machine hours per 100 pieces.

Special Miller—Lines converge to bring each segment of the tricone to the specially built 5-station Ingersoll miller where rows of teeth are cut using a special indexing turret. Machine has four spindle heads and each station holds three cones. Work is indexed from one station to the next with one station being used to load and four to cut. Cone teeth are milled, using special holder adaptor and draw mandrel. First and second spindle stations mill the long and heel rows, third and fourth stations mill the inner and top rows of teeth. Entire operation is at 1000 revolutions per minute with 4 inches per minute feed and production is 29 pieces per hour. The special holder design is inserted in the pattern desired, depending on the tool angle. Cutters are high speed steel and coolant is used.

Work moves to inspection and hard facing, preparatory to heat treat. There are intermediate bench operations all through this flow to mark identification, burr and file teeth.

Hard Facing—Cone bit teeth are hard faced with tungsten carbide by the atomic hydrogen welding technique in which electric arc performs in an atmosphere of hydrogen. This is one of the largest set-ups of its kind in industry with 69 welding stations. The company produces its own rod which is a combination of steel and tungsten particles in an unfluxed condition. A fan shaped welding flame is placed on the work by the process.

These self-cleaning, intermeshing cones with a tooth design to fit all formations (harder rock requires more teeth), have weld spatter removed. They then move to grinding of gage angles on a specially designed automatic, hydraulic, electronically controlled Besly grinder in which both work and abrasive wheel revolve. This is a very fast machine which turns out 50 pieces per hour.

Head Section Broaching—Head sections are mounted on a special loading fixture using chain delivery to a Footburt machine which broaches them at 120 degree angle at rate of 3 pieces per minute. Dowel holes are drilled, then the work comes to a Milwaukee No. 3 milling machine equipped with special V-type tandem holders. This mills the groove for the assembly weld. This is done by high speed steel cutters at 192 revolutions per minute at 25 inches per minute feed and using air chucking. Finally, cone pin is turned on an 8-spindle Bullard Mult-Au-Matic with special fixtures that permit a great variety of angles to accommodate the many different head specifications.

Cones come to one of three Holcroft carburizing furnaces, arranged parallel in the recently enlarged heat treat department. Carburizing is continuous. Forty cones are loaded per tray and cycle is 50 minutes to produce a 0.080-inch case, and 55 minutes for a 0.090-inch case. Usual practice is to get a 0.080 to 0.120-inch case depth 0.90 to 0.95 per cent maximum carbon at 1700° F in an atmosphere consisting of generator and natural gas.

Selective Carburizing—Two carburizing furnaces are used for the heads and operate the same as for the cones, using about 600 cubic feet per hour of generated gas. Water courses and bearing pins are selectively carburized by packing in cups with compound. They ride into the carburizing furnace on special fixtures, loaded 18 sections per tray, and are placed in an atmosphere in equilibrium with 0.15 carbon to produce a 0.080 to 0.090-inch case with a 45 minute time cycle.

Heat treat flow of cones and heads is from carburizing to refinement of core to hardened case to tempering. Heads receive two quenches, the first to refine the core and the second to harden the case. Radiant tube atmosphere controlled furnaces are used. Atmosphere is adjusted to equilibrium with 0.25 carbon steel which leaves the bit body machinable and decarburizes the bearing pin only slightly. Refining cycle is 8 minutes at 1550° F with nine sections loaded to a tray, passing continuously

(*Please turn to Page* 116)

Fig. 2—Cones and heads for rock bits being assembled prior to welding together the three sections which constitute the finished product

Fig. 3—Thread grinding of tapered shanks of the rock bit is done in one pass on a Jones & Lamson thread grinder. Assembled Tricone bits are shown in the foreground

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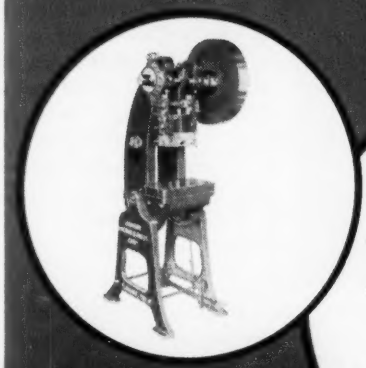

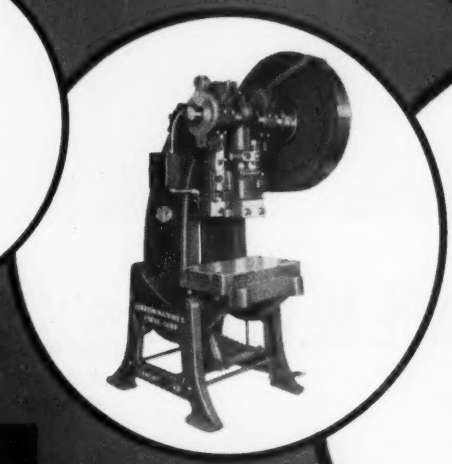

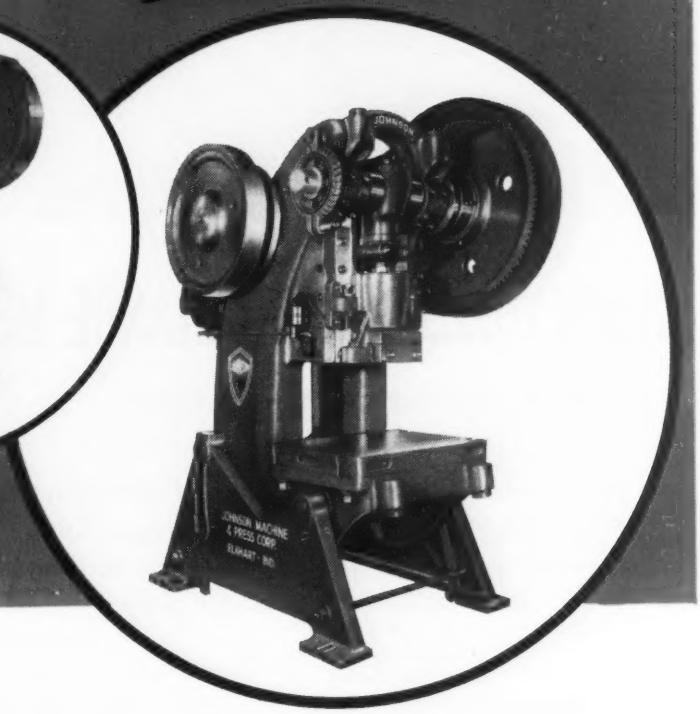

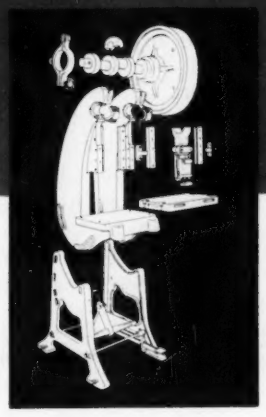

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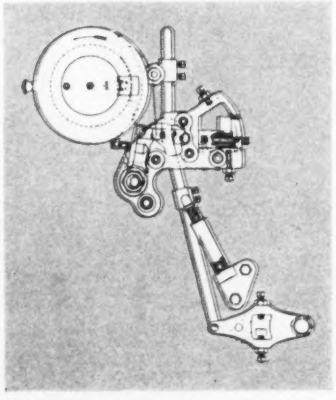

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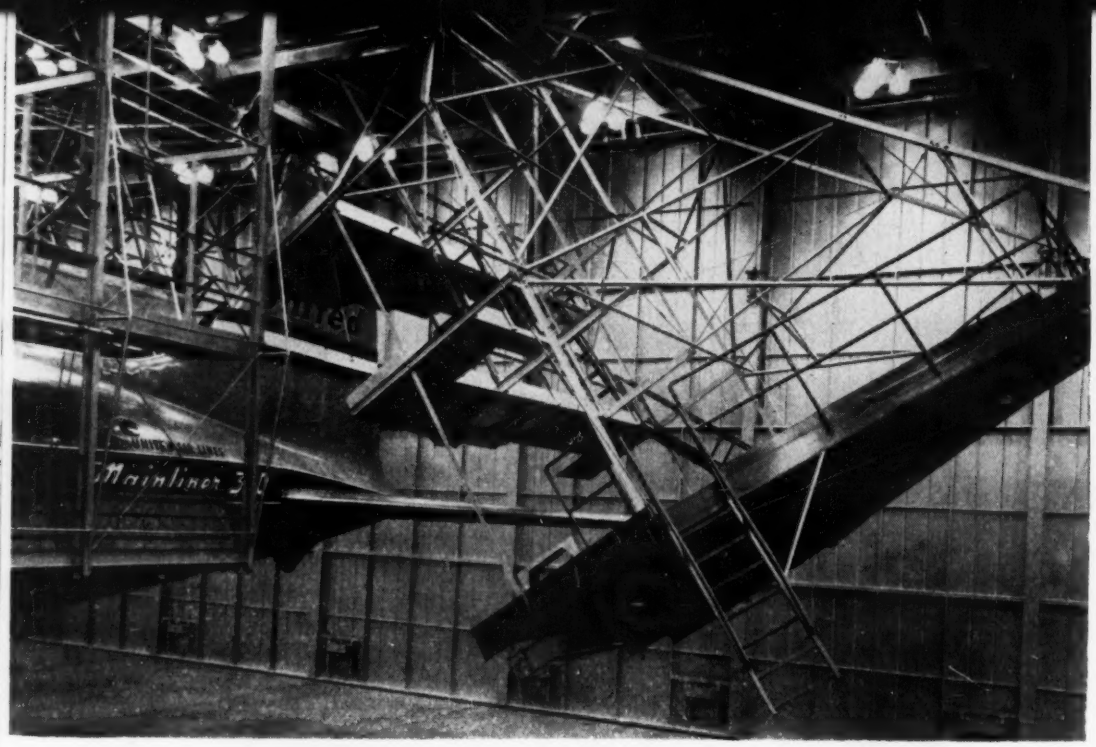


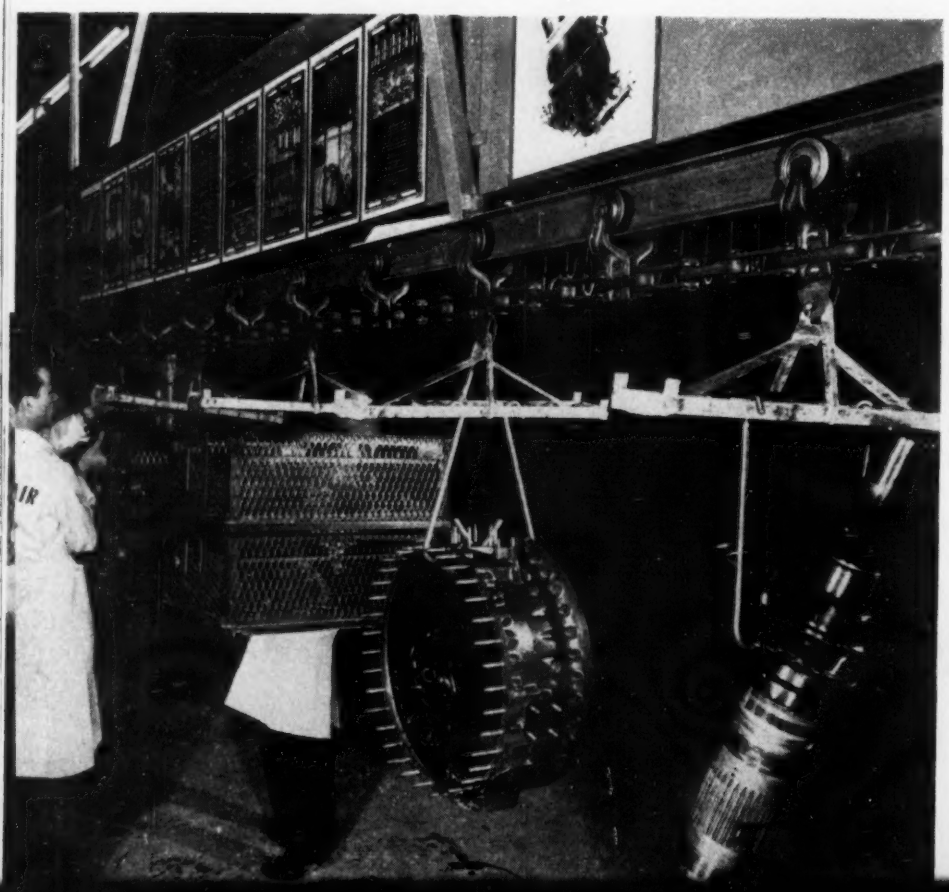
Fig. 1 (left)—Steel framework, weighing about a ton, is lowered to fit snugly around tail section of a DC-6 by means of a ½-horsepower motor

Fig. 2 (below) — Parts of a disassembled airplane engine starting along conveyor towards washer tank. Small parts are placed in wire baskets according to arrangements shown in diagrams above conveyor

CONVEYORIZED MAINTENANCE METHODS

. . . reduce airliner overhaul time

Overhead conveyors, monorails and electric hoists used to handle heavy engines at west coast repair base. Cleaning of engines accomplished in a 160-foot washing tank in a 5-hour continuous process



EXTENSIVE conveyorization is used to increase operating efficiency of the new maintenance base of United Air Lines at San Francisco. The new structure, engineered and built by Austin Co., Cleveland, is designed to maintain and overhaul the airline's fleet of 144 planes without waste time or effort. Repair base covers 116 acres on which there are 700,000 square feet of buildings.

When a big DC-6 airliner moves up to the steel hangar doors which weigh more than 25 tons, a button control operating a 6-horsepower motor raises the door in 15 seconds. The airplane is then pulled inside the hangar along a white center line and into a "push button" dock by a small tractor using a tow bar.

When plane is in the dock, hydraulic jacks lift it several inches off the floor and catwalks are lowered from a metal framework on either side of plane. Next, a giant metal framework is lowered from ceiling to fit around the entire tail assembly, Fig. 1. Each of the two units weighs almost a ton, but is moved down into place smoothly by means of an electric motor. A hydraulically operated ramp comes up from the floor to connect with the long catwalks at level of main cabin door. Within 10 minutes of the time that the plane nosed its way into the hangar, 50 workmen are swarming over it.

Electric hoist operators prepare to lift the four engines off their mounts even as mechanics are unfastening connections. Radio and electrical instruments are taken out to go to their respective shops. Cabin fixtures

(Please turn to Page 107)

How Atmospheric Nitrogen Encourages

Galling and Fatigue Failures

By H. SCHOTTKY and H. HILTENKAMP*

Severe local friction of steel parts resulting in galling also leads to the absorption of nitrogen from the atmosphere. From the distorted surface, made brittle by nitrogen absorption, cracks starting under alternate stresses may become the starting point of fatigue failures. Increase in nitrogen content can be shown metallographically as well as chemically

DRY friction of iron and steel is not a purely mechanical process, but also a chemical one. Under rolling friction with slip, and in the presence of oxygen, formation of iron oxide occurs. These facts were first reported in 1929 by M. Fink, who found the iron oxide as a coating on the roll surface as well as in the wear dust[1].

Considerably older than this knowledge gained in the laboratory is the practical observation referring to the appearance of red to black rust ("friction-rust" or "bleeding") at bearing surfaces, etc.[2] In fact, this phenomenon can occur in very odd forms.

Undoubtedly, "friction-oxidation" and "bleeding" are closely related processes.[3] From the fact that fatigue failures are frequently observed at bearing surfaces—sometimes roughening of the surface occurs at the same time—it was concluded that the "friction-oxidation" was also responsible for lowering the fatigue limit at bearing surfaces.[4]

A different opinion is held by A. Thum and F. Wunderlich[5] who believe oxidation to be of only secondary importance as compared to the mechanical action. This opinion is based on tests made on bend specimens and also on the test results obtained by S. J. Rosenberg and L. Jordan.[6] The two latter investigators, using an Amsler machine, found greater wear and more severe roughening in an atmosphere containing no oxygen than in an atmosphere which did contain oxygen.

At the testing laboratory of the Fried, Krupp Aktiengesellschaft, Essen, there have been on record for a number of years observations to the effect that fatigue failures of leaf springs very often start from brightly rubbed areas on the surface while the presence of "friction rust" cannot be found. In the metallographic investigation of these spring leaves and other parts, the indications became stronger and stronger that it was not oxygen but rather nitrogen which had a strong influence on surface destruction through galling.

A silicon-steel spring leaf with three bright areas produced by rubbing of the leaf on top was studied. A picral section at 200x magnification showed numerous cracks, which frequently formed the borders of oval-shaped areas of distorted metal; these were typical for this type of wear. However, at higher magnification, there is no indication of either plastic deformation or of any other structure in the surface zone.

On the other hand the material of the surface zone embedded itself in the underlying structure which became severely deformed. This apparently means that the surface material is very hard, a fact which was confirmed by the scratch-hardness test. A more severely roughened spot was the cause and start of a fatigue crack which appeared at 5x magnifications. As shown in a longitudinal section through this area, the hard layer has disappeared from the surface. The extreme surface is very ununiformly deformed and torn. Particles of the above-mentioned bright surface layer material have penetrated deep into the cracks and folds.

A clutch spring of manganese-steel showing a friction spot was lightly ground, polished and etched on the surface. Dark areas showed up where the oxide skin had not been completely removed. In the structure, a light network has been observed which might at first appear to be ferrite. However, the higher magnification does not confirm this. Apparently, the network stands in relief, which means that it is hard and very little attacked by the etchant; unless it is cementite it can only be nitride.

To obtain analytical proof of the suspected nitride a microchemical checking method had to be employed.[7]

(*Please turn to Page* 110)

TABLE I

Point of Test	Surface Characteristics	1st Layer Depth in m/m	1st Layer % N	2nd Layer Depth in m/m	2nd Layer % N	% N in Interior
4	Very heavy oxide deposit	0.072	0.013	....	....	0.007
2	Medium oxide deposit	0.035	0.015	0.063	0.011	0.007
1	Rough with slight oxide deposit	0.050	0.019	0.056	0.013	0.007
3	Smooth, bright	0.029	0.034	0.071	0.007	0.007
5	Smooth, lustrous	0.035	0.012	0.071	0.008	0.005
6	Highly lustrous	0.095	0.019	....	....	0.005

Sample #1 to #4: Manganese-steel with .60 Carbon, 1.50 Manganese.
Sample #5 & #6: Silicon-steel with .40 Carbon, 1.50 Silicon.

TABLE II

	Surface Layer Depth in m/m	Surface Layer % N	% N in Interior
Severely roughened flank	0.040	0.013	0.004
Little worn flank	0.045	0.008	0.004

Scrapings from a small gear of chromium-nickel steel which was badly worn and showed pitting of the tooth flanks were analyzed as follows:

At the point of friction	0.042 and 0.035% N
In the interior	0.0065 and 0.006% N

* Translation of this German technical paper was made by R. G. Sartorius, metallurgist and engineer of test, National Lock Washer Co., Newark, N. J. For further data on "Fretting Corrosion", see STEEL, April 5, 1948, p. 72.

APPLIED
X-Ray Metallography

Value of x-ray investigation is based upon the new approach it affords to the science of metallography rather than by the number of problems it is capable of solving. Microscopic along with x-ray examination frequently reveal more information

THIS is the first of a series of articles written especially for readers of STEEL. The material is presented in a comprehensive manner for the benefit of the metallographer who is about to enter this field though it will be greatly prized by those whose routine work applies to x-ray investigation of metals.

The treatise will assist the engineer, metallurgist and physicist in their study of interactions within a metal when being mechanically worked, heat treated, quenched, tempered, etc. Early articles, which serve as a foundation to the proper understanding of this timely subject, will be followed by a large number of right-to-the-point applications of x-ray studies including: Effect of Cooling Rate on Sub-Boundary Grain Structure, X-ray Metallography of Hot Rolled Metal, Luder Lines, Evidence of Grain Distortion During Annealing, Recrystallization of Zinc at Room Temperature, X-Ray Metallography of Tool Steel, etc.

The author, Norman P. Goss, is an authority on x-ray metallography, and his treatment of the subject, starting in this issue, plainly demonstrates that there is a highly important field of metallography which lies just beyond where the microscope leaves off, and which supplements the finding of microscopic examination.

Steel plant laboratories, which have not yet launched upon the exploration of this field by the use of the x-ray, will meet head-on with surprise when this too is applied to metallurgical problems and practices.

By NORMAN P. GOSS
Consulting Physicist
Cold Metal Products Co.
Youngstown, O.

PRIOR to 1900 the only practical use for crystals was jewelry. Little attention was given to their structural and physical properties, except those properties studied by the mineralogist. In recent years, however, the picture has entirely changed, many crystals now being of great technical importance. For instance, Rochelle salt and quartz crystals are used extensively in telephonic, broadcasting and sound-recording and reproducing equipment.

In the field of metallurgy extensive investigations have been made on metallic single crystals of iron, aluminum, copper, bismuth, zinc and magnesium. These studies have given a better insight into the behavior of these metal single crystals when subjected to compression, tension, creep, fatigue, plastic deformation, and magnetic and electrical forces. These investigations also revealed that the physical properties depended on the crystallographic direction. For example, in pure iron single crystals the magnetization is easiest along the (100) direction, and knowing this it was possible to develop a silicon-iron strip steel in which the grains were oriented with the (100) crystallographic direction in the rolling direction. This development reduced the weight of the distribution transformers, radio transformers, etc., by as much as 40 per cent.

X-ray diffraction studies have also shown that perfect crystals can be grown in silicon-ferrite (1 to 4 per cent silicon) with comparative ease. Good magnetic properties are associated with perfection of crystallinity. Therefore, it is desirable to know the conditions of cold rolling combined with heat treatment which will give the silicon ferrite grains the most perfect structure. This condition is necessary in addition to having the (100) direction in the rolling direction.

X-ray studies have proved fruitful in the study of certain important aspects of plastic flow, and it is now well established that plastic flow can only take place on a limited number of crystal planes, and in specific crystallographic directions. However, much remains to be discovered, especially the nature of the cohesive forces, and their interaction as slip proceeds in a crystal due to forces of deformation. This much is known, however, that the electron shells supply the binding forces, and more recent researches seem to indicate that the cohesive forces are tied up with the valence electrons. X-ray methods should yield much additional information about the forces due to the valence electrons.

The x-ray method naturally becomes unique when it discloses information not discernible with the microscope. In the study of crystallite or particle size the microscope is limited by its resolving power, while the x-ray method is not subjected to such limitations. As an example, when the crystallites or the grains are smaller than 10^{-4} centimeters, they approach the resolving power of the microscope. Particles in the range of 10^{-4} to 10^{-7} centimeters can easily be measured by x-ray methods, and many important physical properties are associated with particle size, such as coercive force in permanent magnets, work hardening, age hardening, the hardness of martensite, etc.

The intrinsic value of x-ray method (metallography) is not measured simply by the number of problems which have or can be solved by this method, but by the new approach it gives to the science of metallography. X-ray diffraction studies help the engineer, metallurgist and physicist visualize the changes which take place within a metal when it is mechanically worked, heat treated, quenched, tempered, etc.

A fundamental knowledge of x-ray metallography is an indispensable aid in the solution of practical as well as theoretical problems.

The Beilby hypothesis is a good illustration on the latter side. Prior to the development of x-ray diffraction methods this theory proposed without proof that cold working tended to reduce the crystals of a metal into an amorphous phase. With the advent of x-ray methods of analysis this theory was found to be incorrect. The x-ray analysis has clearly shown that even the most drastic cold working fails to destroy the crystallinity of a metal. Besides this, the x-ray method has definitely established that cold working fragments the grains and with continued cold working the grain fragments tend to become oriented in a definite direction as related to the direction of cold work. The x-ray has also proven that cold working processes may develop complicated deformation textures, which depend upon a great many factors. Much remains to be learned about the mechanics of plastic flow, the forces involved and the crystal structure of the deformed grains.

As a result of this new knowledge, the Beilby theory required modification. Some now believe that a limited amount of amorphous material is developed, when a metal is mechanically deformed, but the amount is too small to be detected by x-ray methods. Others have abandoned this theory entirely. Whether some amorphous material is developed during cold working is a question which still requires confirmation. However, the important point is that without the x-ray diffraction method the original Beilby hypothesis could not have been tested, and the theory of plastic flow could have continued its development on an erroneous assumption. It cannot be denied, however, that the Beilby theory served a useful purpose.

In many instances metals which appear to have the same structure when examined under the microscope, differ when examined with the x-ray. This phase of x-ray metallography awaits further development. A number of examples which have been of value in the solution of practical problems will be given later.

Like other methods, x-ray analysis has its limitations as well as its advantages. In many instances, the microscopic examination and x-ray analysis supplement each other. As an example the x-ray method cannot indicate the existence of pearlite, sorbite, or in general the carbide phase in steels when the

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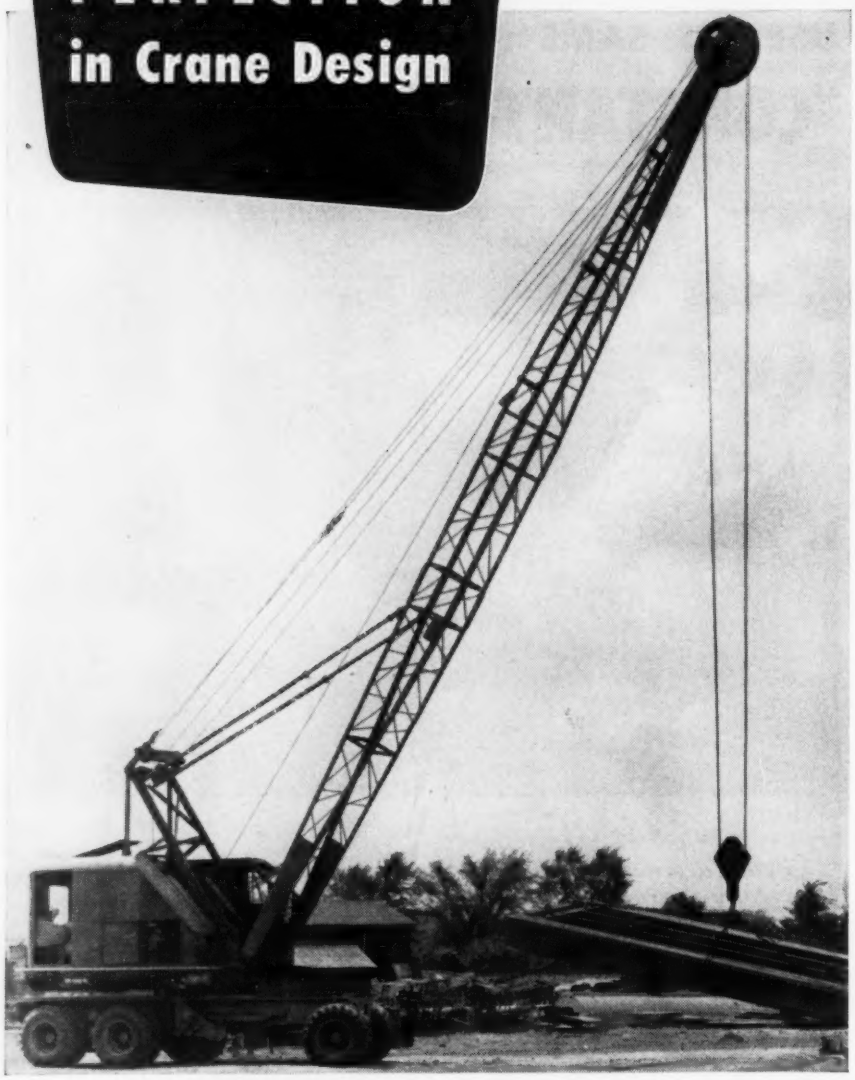

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carbon content is less than 0.80 per cent. This field belongs to the microscope. However, the x-ray analysis clearly shows how these various carbide phases effect the structure of the ferrite, and this is just as important. In general, each of the various carbide phases modify the ferrite structure in a different way.

The x-ray has also proven its usefulness in the study of order and disorder phenomena in certain types of alloys. In the ordered state, the atoms are arranged on a sort of super lattice, and in general the physical properties are also changed. No doubt the future will find important applications for structures of this kind.

This method of analysis is useful in the study of solid solutions, and this field should develop more rapidly, in that this phase of theoretical metallurgy has been placed on firm ground due largely to the far-reaching work of the eminent English physicist, Hume-Rothery.

From the foregoing it is obvious that one must have a good knowledge of the lattice theory concept, and the physics of x-rays. In so far as applied x-ray metallography is concerned, one must have in addition to the above a good knowledge of the technique, and proper choice of apparatus at one's command.

The remaining chapters will be developed with these thoughts in mind, however, with the emphasis on how to apply this method to metallurgical practices and problems.

German Magnetic Alloy Reproduced Successfully

Revolutionary changes in the rectification of electric power are believed possible with Permenorm 5000-Z, a magnetic alloy resulting from a fusion of nickel and iron under an intricate heat treating process, which was recently reproduced for the first time in this country at Naval Ordnance Laboratory, White Oak, Md. A symposium on magnetic materials will be conducted by the Laboratory in the near future.

The alloy was first synthesized in Germany in 1943 and was applied in electrochemical industry in construction of huge rectifiers. After the war, the metal could not be duplicated even though details of the process were available because of the intricate heat treating process required. In addition to duplicating the German process, scientists at the Naval Laboratory have developed a more satisfactory process for adapting the material to modern mass-production techniques.

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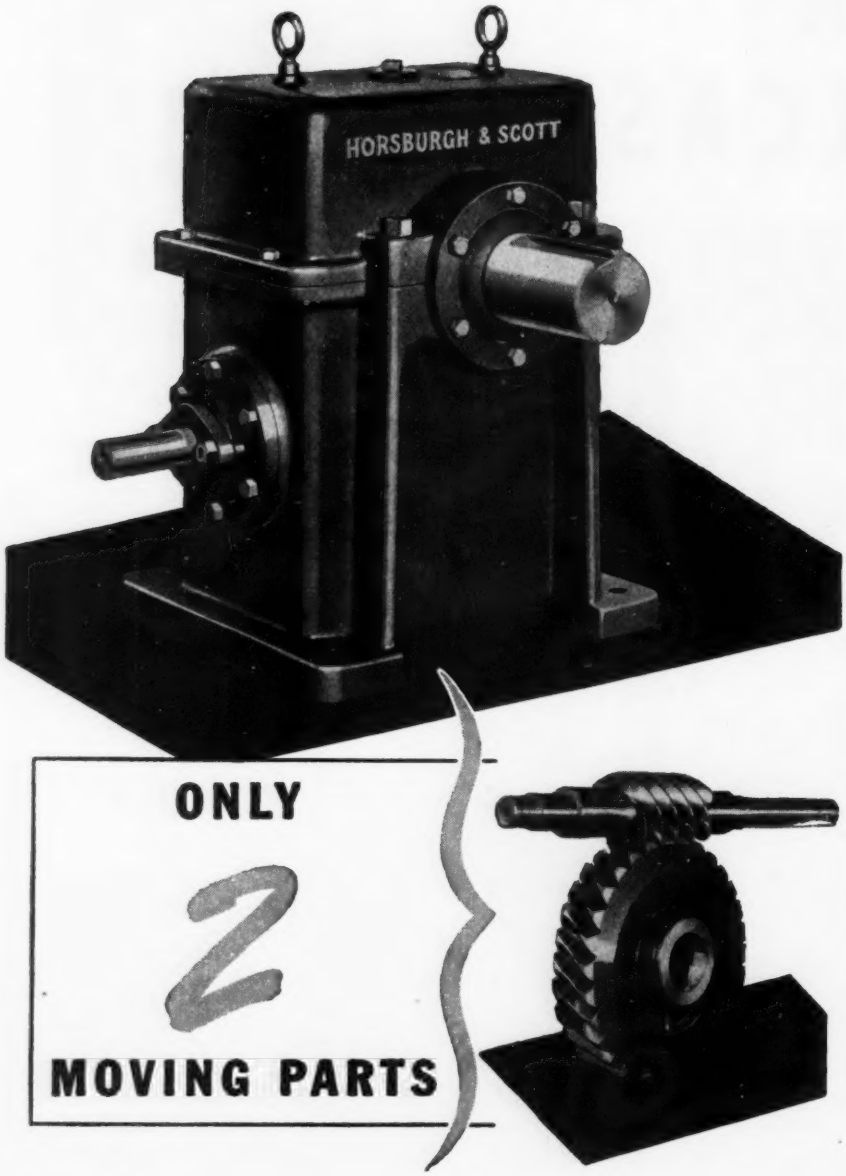

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Forging Practice

(Concluded from Page 79)

three sets of dies to make the drop forging. Drop forgings that are large in size may require the use of two or more sets of dies. In some cases the drop forgings may not be so heavy or large, but may be quite spread out. Each size of drop hammer is limited in the width of dies it can use. Sometimes the preliminary dearing out operation may be performed in the smith hammer, or in the forging machine.

In all cases, the finishing or final forging impression is placed in the center of the dies, or as near the center as possible. This is done because it reduces the tendency toward misalignment or die shift in the drop forging. Even if the dies are lined up properly with each other, the drop forging operation can tend to pull the upper or ram die out of alignment. It is important that die shift should be kept to a minimum or eliminated. Fig. 22 shows die shift in a drop forging. It is evident that if the two dies do not mate correctly. the finished forging may be unusable.

Another defect that tends to creep into drop forgings is the cold shut. This is caused by failing to observe the simple laws of plastic metal movement. The flow of metal will not change direction unless it is forced to do so, and provisions must be made so that it can change its direction in a natural manner. Fig. 23 sketches the development of a cold shut.

(To be continued)

Special Machine Performs Cylinder Block Finishing

Special machine tool which combines four finishing operations on automotive cylinder blocks has been developed by Cross Co., Detroit. Designated as the Transfer-matic and equipped with a continuous automatic material handling device, it can finish a total of 64 pieces per hour at 80 per cent efficiency.

Conveyor connections are provided for bringing parts up to the machine and for taking finished pieces away. Four cylinder blocks are cut at one time progressively. Work sequence at the four stations is as follows: Rough reaming of eight valve guide bushings, counterboring of four exhaust valve insert parts, forming of four intake valve seats and finish reaming of the eight valve guide bushings. Transfer, locating and clamping are all automatic.

Maintenance Methods

(*Continued from Page 94*)

are removed, fuselage, wing and tail are prepared for repainting, tires are removed and wing stabilizer and control surfaces are checked for dents.

Disassembly Sequence — After removal from their mounts, the engines are moved on engine and mount dollies to the power plant department. Upon arrival in the shop, each engine is given a quick steaming to remove outside layers of grease and dirt. Order of disassembly is as follows: Reduction gear, cylinders, crank case, main case assembly, rear intermediate section, diffuser, rear support plate, rear accessory section, front support plate and main crank case.

Large parts are fastened to a 1280-foot long overhead endless chain conveyor, Fig. 2, and others are put into metal baskets which are compartmented for even the smallest items. Conveyor, which will take components of at least four engines at one time, is driven by two 1½-horsepower motors at speed varying from 9 to 27 inches per minute.

Automatic Washing—By conveyor, the parts come to 160-foot long, hairpin shaped washing tank. Inside the tank there are 30,000 gallons of different cleansing solutions including water, petroleum solvents and other chemical compounds which clean the parts in stages. There are seven washers, each powered by a 20-horsepower electric motor, distributed through the length of the tank which churn the solution and pump high pressure streams at engine parts.

Approximately 5 hours after they enter the bath parts begin to emerge. They are detached from conveyor and given further cleaning, inspected, repaired or replaced if necessary, then stored to await reassembly. Parts of each engine are kept together so that replacement parts may be installed but not parts from another engine. Cylinders go through a secondary cleaning process in a steel cabinet and subjected to a spray of ground walnut shells projected under compressed air. Walnut shells are used since they are not as abrasive as sand.

Storage on Conveyors — Reassembled cylinders are placed on a 1650-foot overhead chain conveyor which is driven up to 27 feet per minute by a 2½-horsepower motor. Cylinders remain on the chain until time for engine reassembly. Because of system of checks and counter-checks it usually requires 12 days before an engine is reassembled and ready for testing.

In spite of the great weight of ma-

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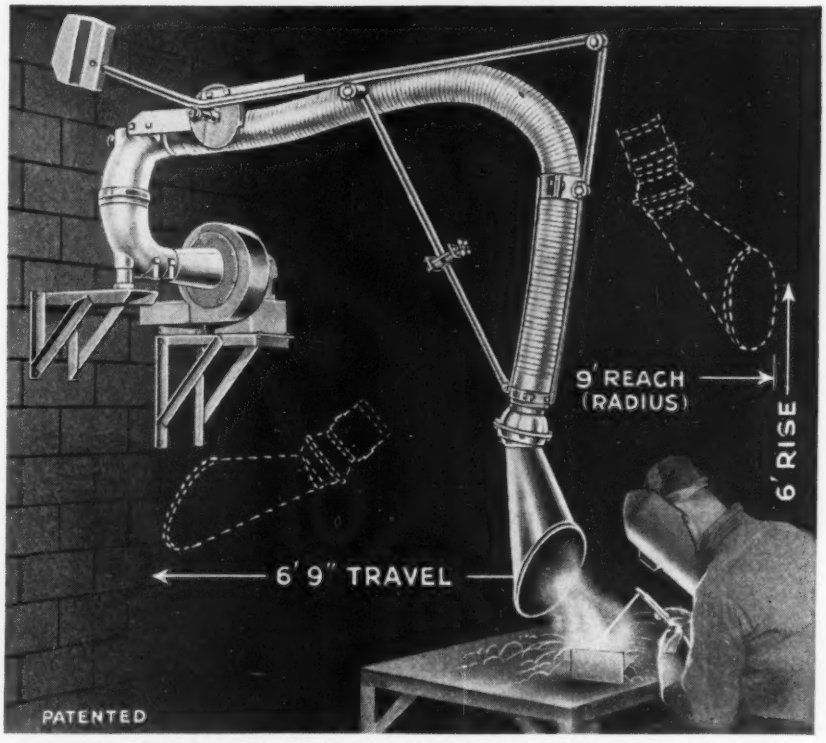

Standard Model D-5310 with hood reaching out 9 feet from wall. Also available in Long Reach Model D-5342 with hood reaching out 15 feet from wall.

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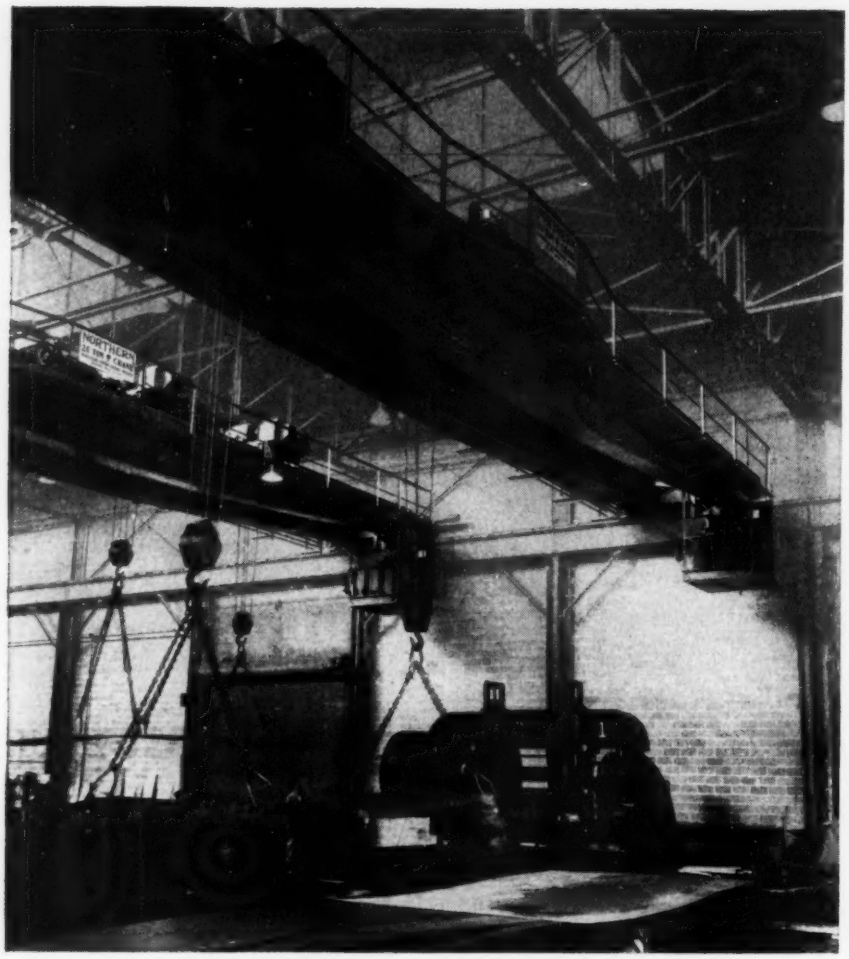

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NORTHERN ENGINEERING WORKS

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terials handled in the power plant department, an engine weighs over a ton and a propeller 352 pounds, not a minute is wasted because of handling and moving. There is a compact overhead hoist on a trolley, handy at every spot where one might possibly be needed. After assembly, engines are taken to the wind tunnels for tests.

While work is being done on the engines all other parts of the airplane are thoroughly checked and overhauled. In four days the plane is ready to leave the dock. It does not wait for its original engines, but has a newly overhauled set installed.

Sulphur Control Is Big Problem in Open Hearths

Greatest source of sulphur that affects steel analysis detrimentally is the fuel, excluding the effects of unusual conditions such as those obtained from extremely high sulphur charge of materials, stated Henry E. Warren, division superintendent open hearths, Carnegie-Illinois Steel Corp., Pittsburgh, at a recent meeting of national open hearth committee of American Institute of Mining and Metallurgical Engineers held at Pittsburgh.

Over an extended period, in a shop using sulphur free natural gas, average sulphur content of steel determined by chemical analysis of samples taken at the melt and final sulphur content of the steel appears to indicate that there is no correlation between sulphur content at these two stages.

Furnaces Charged With Limestone

To study effects of sulphur in limestone on sulphur in steel when using sulphur free fuel gas, furnaces were charged with limestone containing 0.36 and 0.04 per cent sulphur and compared with the normal supply which ranges from 0.14 to 0.18 per cent. Results were the same in all cases with average preliminary and final analyses being 0.027 and 0.028 per cent respectively.

There seems to be no correlation between sulphur in iron and sulphur in steel for orders having specifications above 0.030 per cent sulphur maximum, Mr. Warren continued. Below this point any sulphur in the system whether from fuel, scrap, iron, limestone, ore or any other source is detrimental. Tests indicate that sulphur in limestone is of minor importance as compared with same amount of sulphur charged with scrap. Greatest amount of pickup of sulphur from the fuel is during the melt down period.

Daniel Boone, Kentucky Frontiersman, escaping by throwing powdered tobacco into Indians' eyes.

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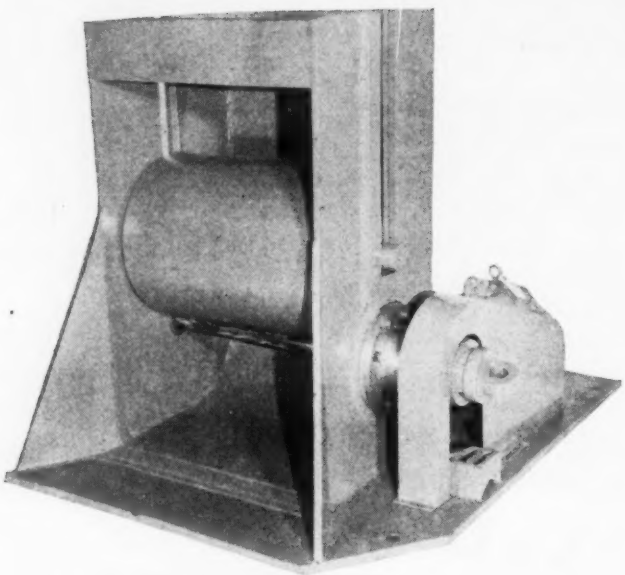
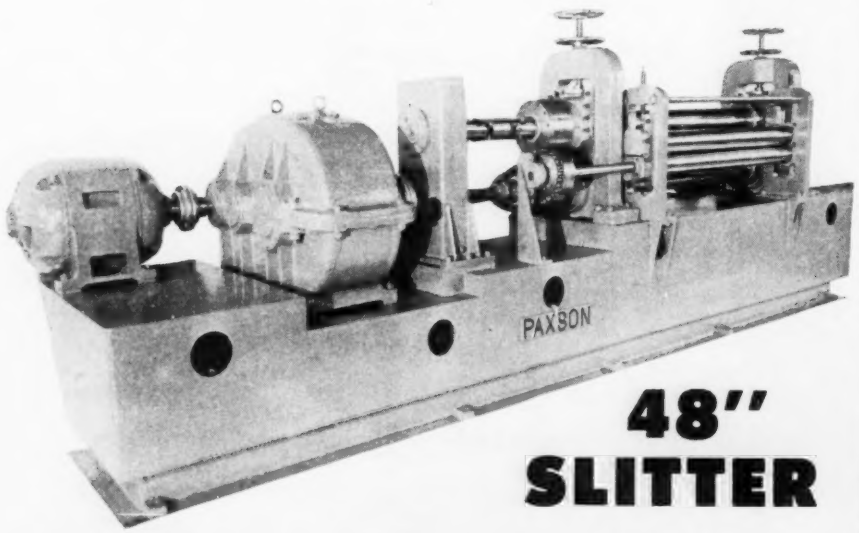


SCRAP BALLER

Here is a new design of an old tool. The steel scrap is fed into the machine and wound around a small driven arbor and at the same time is compressed by the floating roll. The bale of scrap, 18" x 24", then is removed by withdrawing the small arbor. The baller can be moved to any location in the plant where current is available and the design is such that the machine will not tip or slide on the floor. Motor, speed reducer and all electrical connections are included and delivery can be made in 60 to 90 days.



48" SLITTER

The Paxson 48" Slitter is designed for sheets and coils. Its maximum capacity is 11 cuts of 11 gage metal, 100' per minute when slitting sheets and 100'-800' per minute when slitting coils. The slitter is equipped with overriding clutches to allow free wheeling of the arbors when coils are being slit. Detachable pinch rolls are provided for use when slitting sheets.

We also manufacture coilers, levellers, pay off reels, edge rollers and the 84" Paxson slitter built for special requirements.

Write for complete information on any of this equipment.

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Fatigue Failures

(*Continued from Page* 97)

Originally, the material for analysis was obtained by scraping. Later, the method of sampling certain areas of the surface was perfected. In this way it was possible to determine the nitrogen content of a 10 to 20 millimeter diameter circular area of the surface without scrapings. This is accomplished by cutting out a cylinder of slightly larger diameter than desired, either on a lathe or with a hollow mill. The cylindrical slug is then ground to a cone shape and a flask is ground fitted to its top.[7]

Chemical analysis of scrapings from a leaf of the above mentioned clutch spring was made with the following results:

Nitrogen Content, Per cent		
Friction Spot	Surface outside of Friction Spot	Interior
0.090	0.0065	0.006
0.074	....	....

The same spring leaf was analyzed using the solution method. At certain points the nitrogen content at the surface, as well as in the interior was determined. The test results are summarized in Table I, together with those obtained on two spring leaves of silicon-steel.

The chemical analysis thus confirms the increase in nitrogen content on the surface. It will be noted also that the less oxide included in the analysis, the higher the nitrogen content. All in all, the per cent nitrogen found is not very high. The solution method has this advantage over the analysis of scrapings in that the sampling is done over an area of known surface and to a known depth. On the other hand, a disadvantage is that in the machining of the sample cones, particles of the brittle surface layer may spall off without being noticed and thus escape being analyzed. Only minimum values, therefore, are obtained by this method.

Observations on Gears—From a badly worn gear coupling, several of the severely roughened tooth flanks—which also were covered partly with friction rust—were examined at the bright areas. The material was a straight carbon steel with approximately 0.40 carbon. At 200x magnification, a more or less distorted ferrite-pearlitic matrix may be recognized with scattered islands of a bright, broken-up constituent. The cross-section, shows that the surface was covered with an almost continuous layer of this constituent; the network formation thus was caused only by grinding off tooth surface projections in preparing the surface specimen.

Microchemical nirtogen determina-

tion on a severely roughened and, for comparison, a little worn tooth flank, were made with results shown in Table II.

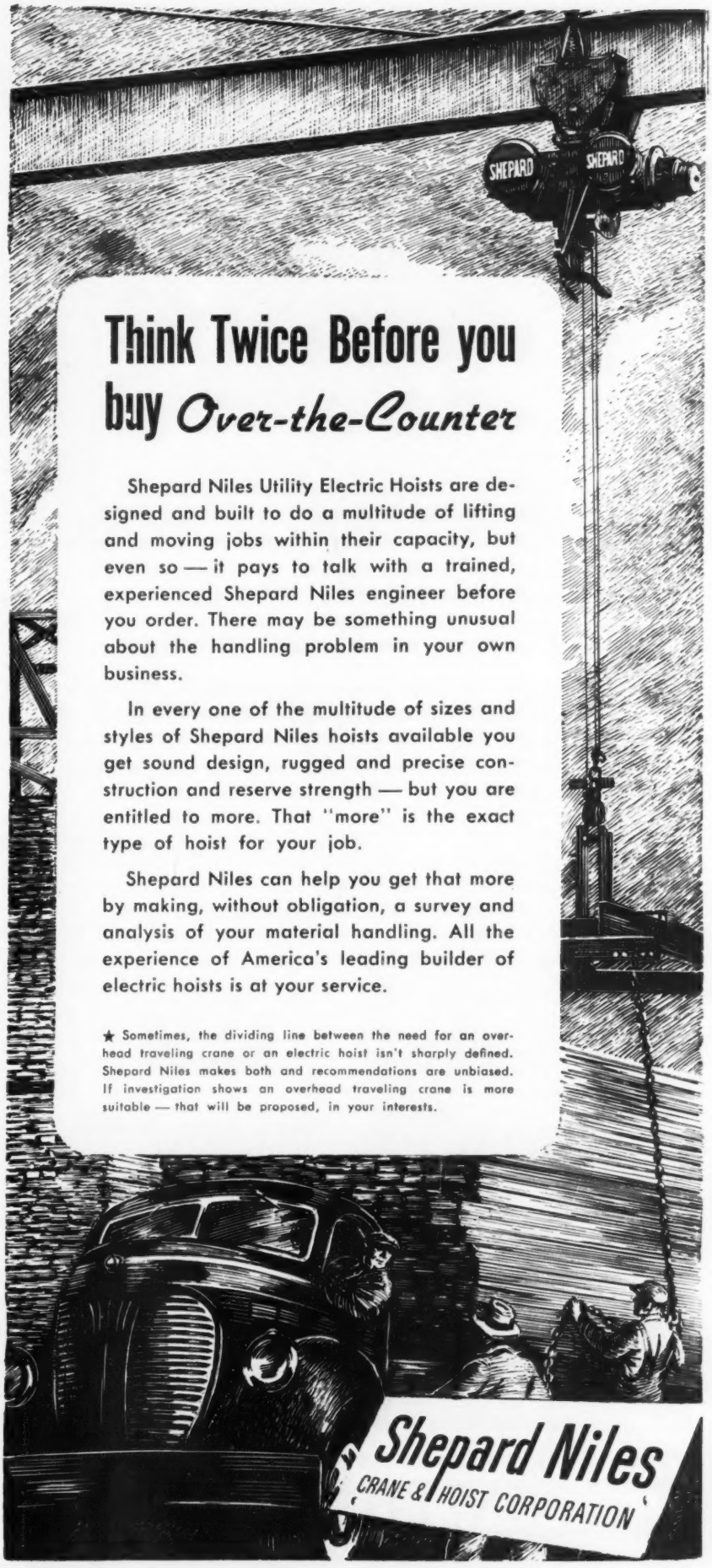
Observations on a Broken Shaft—A chromium-nickel steel shaft of a turbocompressor had broken with indication of a fatigue failure. At the point from which the fracture started, very pronounced friction areas were present. A section through one of these areas was cut parallel to the axis of the shaft, i.e., at right angle to the fracture. After etching, a very odd picture resulted. Numerous fine cracks were observed, some of which penetrated quite deep into the material. Two main directions appear to be prevalent.

Furthermore, one of these cracks —and at a higher magnification the others too—contains a bright substance which continues deep into the interior and which itself is split through the center by a fine crack. In a few isolated cases, remnants of this substance are left even on the torn surface. Here, below the light surface layer, and very distinctly separated from it, a darker zone such as is normally found in the surface layer of nitrided alloy steels can be seen at 1000x. Both layers, light and dark, exhibit fine grain boundary cracks while the unchanged matrix is free from cracks.

Contrary to this, the surface section at 1000x magnification shows the light surface constituent in secondary, rather than primary formation. It here appears broken up into partly-rounded islands and pressed into the softer matrix. This substance is not homogeneous, but consists of two constituents as is the case in nitrided surfaces. Analysis of scrapings obtained from one of these friction areas showed 0.029 per cent nitrogen.

Nitrogen Absorption in Metal Shaping—Since in the shaping of metal, very severe friction forces occur between the cutting edge of the tool and the work, it was reasonable to assume that in this process too, absorption of atmospheric nitrogen might take place. This assumption could be confirmed by several tests. The investigation, which was of particular interest in connection with the chemical determination of nitrogen, was carried further in the work of P. Klinger and W. Koch. Furthermore, in the preparation of microsections of soft iron, a superficial nitrogen absorption was observed.[5]

Conclusive evidence has been presented in the above to show that, under severe friction, not only oxygen, but also nitrogen is absorbed from the atmosphere. This conclusion is not nearly so far-fetched as might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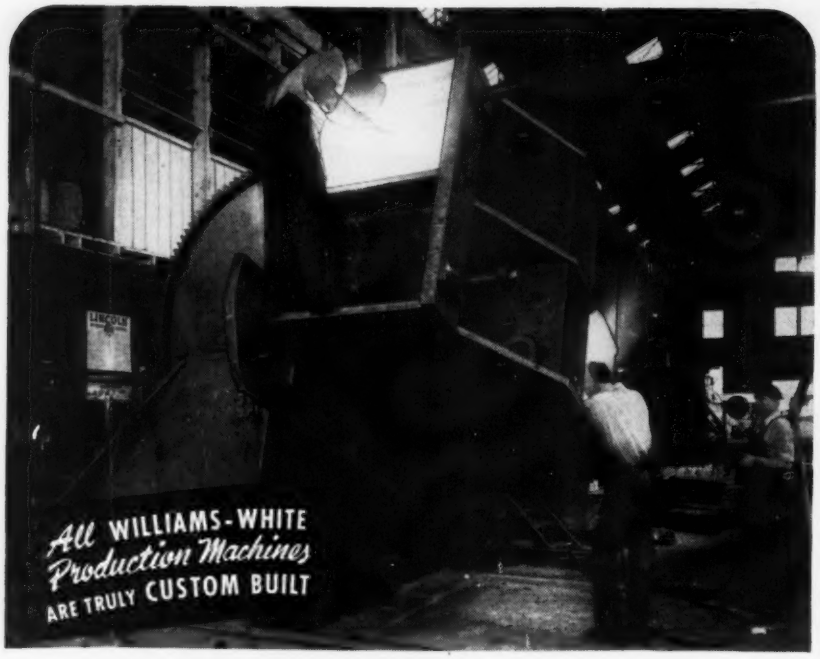

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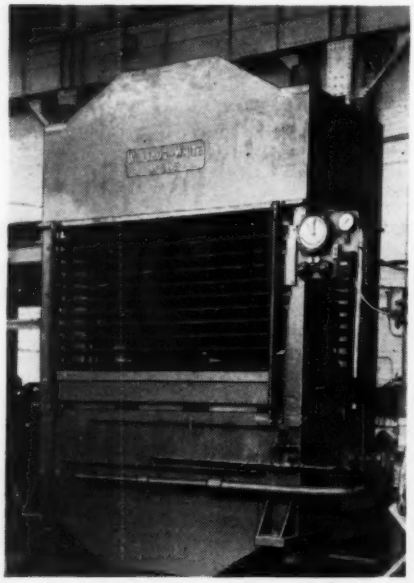

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first appear. It is a known fact that active nitrogen (for example in the form of ammonia) begins to react with finely divided alpha-iron at 200° C, in solid form at 300° C.[9, 10] Conversely, highly activated iron may bring about—by taking actual part in the reaction—a combining of inactive, molecular nitrogen with hydrogen at only moderate temperatures.

While iron is not one of the technically best catalysts, it is, however, one of the oldest catalytic agents for the ammonia synthesis. There is hardly any doubt that the iron surface becomes activated under friction with high specific pressure such as occurs at pressure areas. It also is certain, under those conditions, that an appreciable local rise in temperature will take place.

Since the formation of nitrides starts in the grain boundaries, the brittleness and crumbling of the surface layer is easily understood. Less comprehensible is at present the combined mechanical-chemical forces which lead to deep cracks. However, we might recall that in corrosion-fatigue, a similar combination of forces exists and that this process has not been fully explained.

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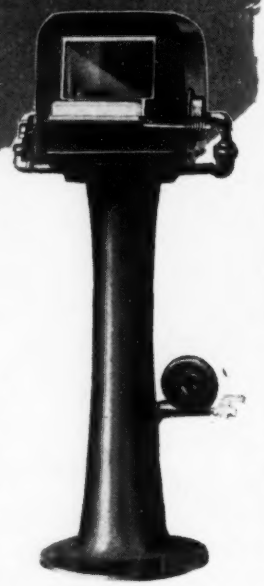

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Assembly Line Machining

(*Concluded from Page* 92)

through the Holcroft furnace, two trays at a time.

Equipment of the heat treat department consists of four gas generators, three carburizing furnaces, four hardening furnaces and two draw furnaces. Cones are hardened at 1425° F and heads at 1475° F. Draw is at 325° to 350° F. These furnaces are all automatic and continuous through heat soak, oil quench and washer, to roller platform and out of drying area.

Assembly Operations — Finally heads and cones come to the two assembly lines, Fig. 2, that are backed up by the storage area. Assembly routing is through four phases: (1) Assemble and weld tricone sections, (2) turn shank of bit, (3) grind threads, (4) face to gage and final inspection.

Arc welding of the three sections to form the complete bit is done in a double row of 24 booths. Before the tack welding involved for this operation, the three sections with balls and rollers receive special application engineering to develop the distinctive bit arrangement required on order.

Welded bit shank comes to an 8-inch Gisholt turret lathe for turning, using carbide cutter and special holding fixtures. The work at this station is handled by a special loading crane. Operations on the shank are (1) face to length, (2) face shoulder, (3) cut inside and outside bevel, (4) turn outside diameter of shank, (5) bevel shoulder. These shanks are all tapered to American Petroleum Institute specifications; tapers being 2 and 3 inches per foot.

Thread grinding of the tapered shank is done in one pass on a Jones & Lamson thread grinder, Fig. 3, using an air operated holding fixture. Floor-to-floor time of 5 pieces per hour for the 6⅝ inch shank is attained. Threads start ⅜-inch from shoulder with four threads per inch on 2 and 3 inch taper. Shoulders are faced to gage on a No. 5 Warner & Swasey turret lathe, using 0.005 to 0.007-inch feed at 84 revolutions per minute and using high speed steel cutters to avoid the "layover" polish which sometimes results from negative rake machining.

—o—

Applications of modern materials handling in a variety of industrial plants are shown in a series of films prepared by Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.

New Books

Factors of Establishing A Small Machine Shop

Starting a Small Machine Shop, by Fred H. Colvin, editor emeritus, *American Machinist;* cloth, 212 pages, 4½ x 7½ inches; published by McGraw-Hill Book Co. Inc., New York, for $2.50.

Essential factors to be considered in establishing a small machine shop are set forth in this book, concisely written in nontechnical language. Among these considerations are: Selection of a suitable location; examples of possible floor layouts; choice of tools and other equipment; actual operation of several of the most essential tools, including drill press, engine lathe, milling machine, etc; cost factors involved in various kinds of work and the problems involved in figuring charges to cover overhead costs.

Illustrated and provided with helpful tables on cutting speeds and times required to perform various operations, the book is a practical guide which should point out many of the pitfalls in business operation to the experienced shop man who is embarking in a venture of his own.

Use of Job Analysis Studied in Volume

Job Evaluation, by Jay L. Otis and Richard H. Leukhart: cloth. 473 pages. 6 x 9¼ in.; published by Prentice-Hall Inc., New York, for $6.65.

Author's main thesis is that job evaluation offers one method, often ignored, whereby wage costs may be reduced, not through lowering of individual wages as some unions claim, but through savings which appreciate from a more efficient administration in wage and salary payments. Job evaluation, the authors contend, also results in a fairer wage schedule with consequent smoother relations between the labor union and management.

Purpose of this volume is to study the use of job analysis in wage and salary determination and administration. Only secondary emphasis is placed on job selection, training, transfer and promotion. The authors describe in detail four job evaluation methods, the ranking system, the job classification system, the point system and the factor-comparison system. Advantages and disadvantages of each are outlined and a thorough analysis is presented showing where and how each of these systems

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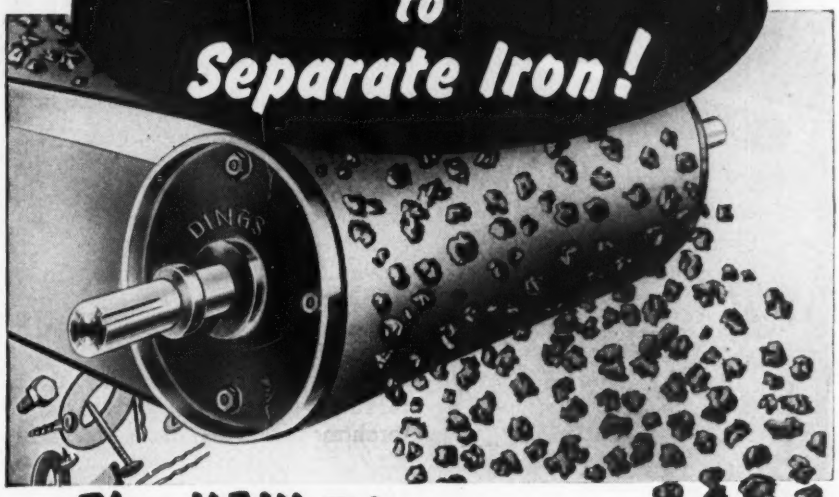

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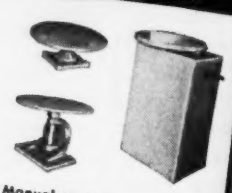
President

Binks Turntables



Manual and power-operated models for spraying all surfaces of large or small units. Six different models, plain and tilting tables to support loads weighing up to 400 pounds.

Binks Model 15 Spray Gun

A small, light gun for touch-up, highlighting, shading, stenciling, etc., where accurate control and fine adjustment are required on furniture, autos, toys, novelties, showcards, etc., etc.

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may be used to the greatest benefit.

Mechanics for setting up each system are explained, with detailed descriptions of accounting methods, cross reference filing procedures and general clerical requirements necessary for successful use of any of the systems also included.

A short, but informative, section of the volume is devoted to labor's attitude toward job evaluation. Brief resumes are given of typical arrangements which have been worked out on this matter between management and labor.

Fundamentals of Fan Engineering Discussed

Fan Engineering, edited by Richard D. Madison; cloth, 808 pages, 4½ x 7 inches; published by Buffalo Forge Co., Buffalo, for $6.00.

Volume is divided into four parts: Physics of air, fans, fan applications and fans and air conditioning equipment. Under fan applications are included such items as heating, ventilation, cooling and refrigeration, combustion and mechanical draft and air cleaning. Problems and selection of equipment, fan details, multiblade fans, limit load ventilating fans, centrifugal fans for industry and several others are contained in the section on fans and air conditioning equipment.

Tables and graphs are used throughout the volume to illustrate applications and to aid in problems that may confront the engineer. The appendix has a list of abbreviations used in the book, table of weights of fixtures used in fabricating, tables of useful data and conversion units and a list of codes and standards.

Machine Shop Guide

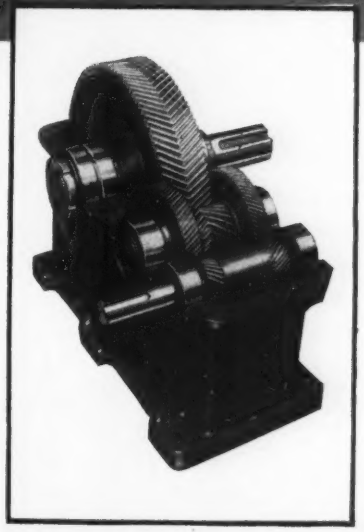
Running a Machine Shop, by Fred H. Colvin, editor emeritus, *American Machinist,* and Frank A. Stanley, consulting engineer and editor, *Western Machinery and Steel World;* second edition, cloth, 521 pages, 8½ x 5 in.; published by McGraw-Hill Book Co. Inc., New York, for $4.25.

Containing a 68-page supplement which includes descriptions of a variety of new methods, devices and materials which came into use during the war, this edition provides a complete guide for the owner or manager of a machine shop in the shop's operations, its manpower and its cost factors.

Of broad scope, the book covers operations of both large and small machine shops and provides examples of solutions to the following problems which arise in all such enterprises: (1) Selection of location;

Jones

HERRINGBONE SPEED REDUCERS



Jones Herringbone Speed Reducers in ratings from 1 to 400 horsepower, and all the other types of Jones Speed Reducers, gears and transmission products are playing their part in speeding up production.

These are products that are built with old time craftsmanship and once they start rolling they keep on rolling.

If any of our products or engineering service will be helpful to you we shall do our best to render as much assistance as possible. Our Bulletin No. 80 "Jones Drives for Industry" will give you a clear picture of our transmission products and manufacturing facilities. Your request will bring a copy by return mail.

W. A. JONES FOUNDRY & MACHINE CO., 4437 Roosevelt Road, Chicago 24, Illinois

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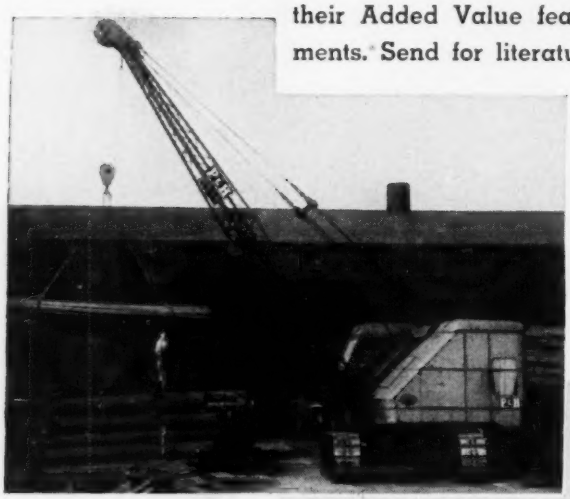
P&H Crawler Cranes do yard jobs

FASTER, SAFER, AT A SAVING!

Have you the handling efficiency outside your plant that you have inside? P&H Crawler Cranes can give you fast, flexible, versatile yard service with one-man operation — to speed materials handling. P&H Crawler Cranes with their Added Value features are wise investments. Send for literature!



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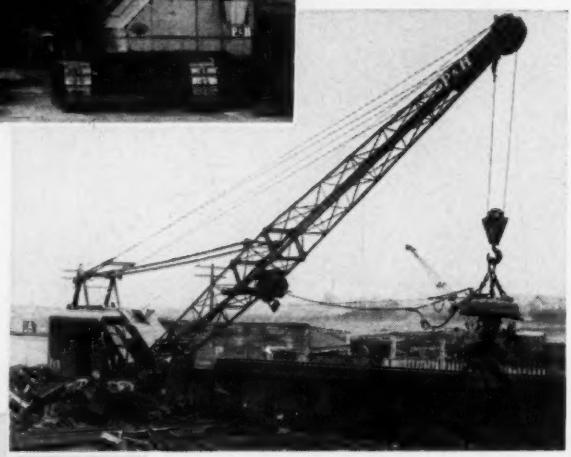
P&H Crawler Cranes are easy to operate because of P&H's smooth, responsive hydraulic control. You can operate them in close quarters because of P&H's exclusive and simplified method of steering and braking.



MAGNET

Equipped with magnet, the P&H Crawler Crane loads scrap quickly. For those countless lifting jobs in plant yards, you can make no better choice than a P&H. Its construction of rolled alloy steels means extra long, trouble-free service.

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Bulk materials are moved speedily and easily with a P&H Crawler clamshell and movement is not restricted to inplace trackage. In addition P&H clear-view, all-weather cabs permit year-round operation.

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(2) kind of building; (3) location of machines and materials; (4) handling these materials in the shop; (5) operation of machines; (6) heat, light and power, and insurance on buildings and materials; (7) inspection of materials and work done; (8) assembly of parts; (9) wage, liability and accident insurance; (10) personnel relations; (11) apprentice and other training of workers; (12) cost systems for estimating and pricing.

Methods by which costs have been reduced in other shops through improved inspection and quality control methods, rearrangement of layout to provide more efficient handling and cut size of labor force, elimination of unnecessary record forms, and job evaluation and rating scales are explained, and many other suggestions are made which might profitably be adapted in any machine shop.

Federal Health Insurance

The Issue of Compulsory Health Insurance, by George W. Bachman and Lewis Meriam; cloth. 271 pages. 6 x 9¼ in.; published by the Brookings Institution, Washington, D. C., for $4.

This study explores the question of whether the federal government should undertake a program of compulsory health insurance, an issue of interest to all segments of society, including industry. The authors' conclusion, supported by a mass of statistics and an examination of the sociological aspects of the problem, is that the United States government should not undertake such a program. Among the chief reasons for this position are as follows:

1. The U. S. health record ranks with the best of all nations, regardless of size.

2. Sharp decline in U. S. death rates during the past 40 years indicates that the present medical system is serving its purpose.

3. Compulsory health insurance programs in Nova Scotia and in scattered localities in this country have had no appreciable effects on mortality or health.

4. Administrative costs of the program on a nation-wide scale would be prohibitive.

The authors recommend that the national and state governments should devote their resources to:

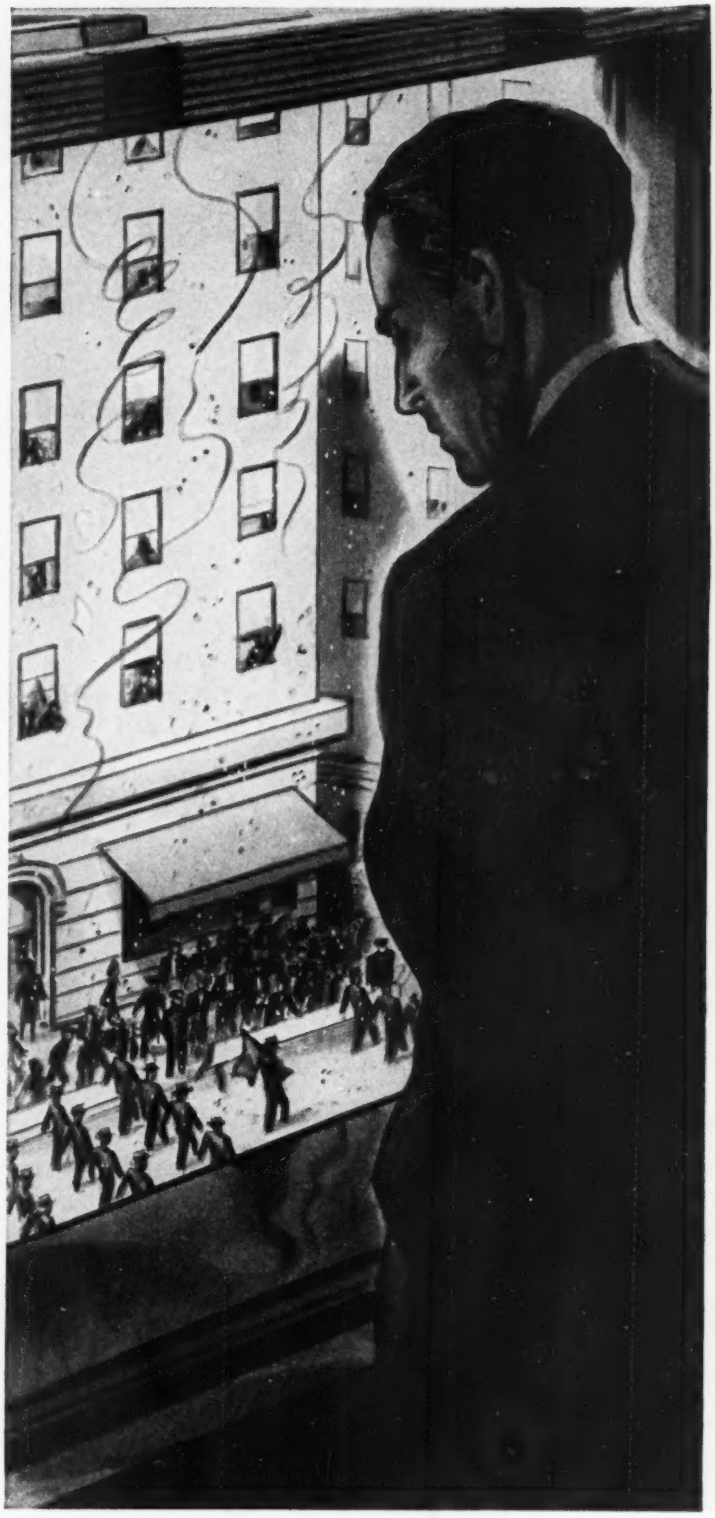
1. Research and development in the fields of public and industrial health.

2. Health education at the school level.

3. Teaching of preventive medicine.

4. Assisting in the acquisition of

MEMO TO PRESIDENTS WHO WATCHED THE BAND GO BY!



HERE'S ONE parade that isn't "all over but the shouting" after the band has passed. It's the Payroll Savings Plan for the regular purchase of U.S. Security Bonds by employees.

Though the formal spring campaign to sell Bonds is over, any company can still move forward with the parade. Right now thousands of companies are putting *additional push* behind their Payroll Savings Plans. Managements of many companies that have not yet participated are *now installing* the Plan.

It's a "look-ahead" plan, that benefits employee, company, and nation. Every $3 invested in Bonds pay $4 at maturity. Personnel records in the plants with active P.S.P. programs show improved employee attitudes—evidenced by less absenteeism and fewer accidents—as the individual's sense of security grows with Bond purchases. And every Security Bond dollar built up in the Treasury retires a dollar of the national debt that is potentially inflationary. It means less bidding-up of prices. Moreover, Bond buyers are better citizens because they have a tangible stake in the nation's future.

It's just as easy to take action now as when the campaign was at its height. Just call your Treasury Department's State Director, Savings Bonds Division, and ask for the material that helps to get a Payroll Plan started or to keep it rolling.

The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

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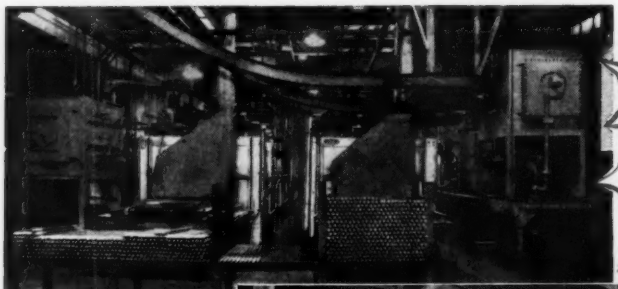
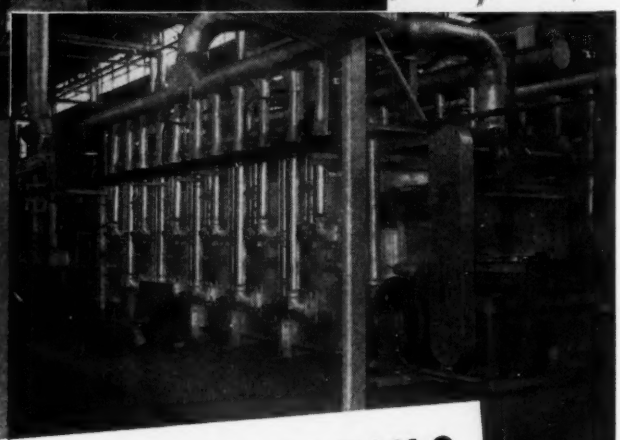


BLAZING THE HEAT TREAT TRAIL



13 years of "trail-blazing" in carbon control. Above are two Holcroft muffle type furnaces installed in 1934. At right is one of three radiant tube furnaces recently built for the same customer.

NON-DECARBURIZING OR CARBON RESTORATION

Was a *Holcroft* Development in 1934

The first non-scaling, non-decarburizing furnaces for high carbon steel were installed by Holcroft in 1934. Both are still in operation. Since then, Holcroft has continued the development of non-decarburizing atmospheres responsible for equalizing and restoring carbon in the basic materials.

Today, the advantages of Holcroft controlled-atmosphere hardening are so widely recognized that practically all modern carbon-control furnaces follow one or more of the principles established by Holcroft engineers.

In carbon control, as in every other large-volume heat treat application, Holcroft engineering leadership can serve you *best.* Holcroft offers *complete metallurgical and engineering service,* from designing the furnace to your individual requirements through the trial run of the completed installation. Thus Holcroft assures performance to your exact specifications with maximum over-all economy.

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physical facilities and training of personnel.

5. Providing systematic care for the indigent.

This volume contains comprehensive statistics on mortality, average days lost due to illness, etc., which would be of value to public and industrial health officials.

Future of American Natural Resources

From the Ground Up, by Paul M. Tyler: cloth. 248 pages. 6¼ x 9¼ in.; published by McGraw-Hill Book Co. Inc., New York, for $3.50.

Mr. Tyler's thesis is that the United States is far from being now or in the foreseeable future a "have-not" nation in regard to its mineral resources. He points out, however, that this country would rapidly approach such a status if we were to follow the line taken by some who reason we should close our mines and import minerals so that we can husband our remaining supplies. Such a course, he argues, would disperse the mining industry's trained technical and labor force, ruin many existing mines through cave-ins and water and discourage exploration for additional mineral sources.

Based on evidence from a comprehensive review of technology, the book provides a picture of the full economic development and prudent employment of natural resources. The technology of winning metals from the ground, the role of minerals in our economy, the background of prices and costs, the essential economic facts about leading mineral commodities and the impact of various national policies upon miners and consumers are all surveyed and analyzed.

While the main body of the book is factual, the final chapters set forth proposals for improving conditions in the industry. The volume brings out the highlights of the mining industry, records its outstanding achievements and analyzes its most pressing problems.

—o—

Installation of an abrasion resisting rubber compound manufactured by B. F. Goodrich Co., Akron, as lining for a shot blast room solved a tough maintenance problem for a New England manufacturer of textile machinery. Steel pellets shot from a hose against the rough castings necessitated frequent shutdowns to replace the planking used to line the room in the past. Since installation of ¼-inch Armorite in May 1947, there has been no maintenance problem.

New Products and Equipment

Cut-Off Machine

Flexible type cut-off wheels are used for removing sprues and risers from bronze, aluminum and iron castings by the swing frame cut-off machine built by Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa. Having full maneuverability through 180 degrees, the machine's wheels operate at a peripheral speed of 15,000 feet

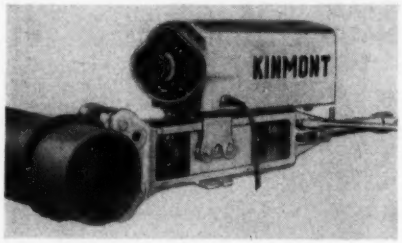
per minute. Cuts can be made to conform more or less closely to the contour of the casting.

Because of the high speed and maneuverability, large risers can be cut by a sawing action, thus maintaining minimum contact area, reducing power consumption and lessening wheel wear. The No. 10-C machine is powered by 7 1/2-horsepower totally enclosed ball bearing motor and driven by two V-belts. It accommodates wheels 16 x 5/32 x 1 inch and weighs about 400 pounds.

Check No. 1 on Reply Card for more Details

Universal Power Unit

Turning of any round, nearly round, or hexagonal object requiring up to 400 pounds of circumferential turning force at a surface speed of from



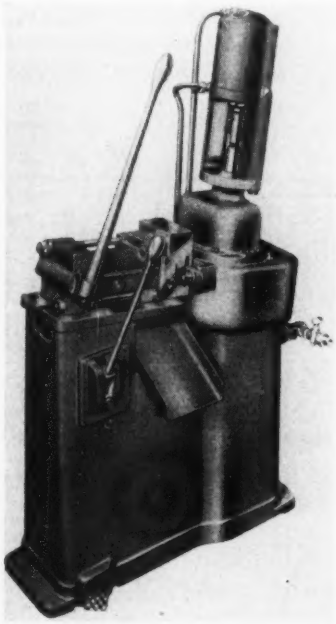
3 to 26 inches per minute is accomplished by the universal power unit designed by Kinmont Mfg. Co. Inc., 718 West Wilson Ave., Glendale 3, Calif. It is adaptable as a positioner for welding, cutting, fitting, grinding, threading, painting, etc. Unit operates on a chain tong principle, weighs 71 pounds and is portable.

Drive chain is provided with quick action connecting links for rapid shortening of chain to accommodate work of various diameters. Remote control operation is possible by a foot switch, an accessory. For handling large tanks or similar objects, adjustable roller fixtures can be utilized, making possible moving of objects weighing as much as 20,000 pounds, provided full weight is not imposed on the power unit. Operation is on either alternating or direct current.

Check No. 2 on Reply Card for more Details

Die Casting Machine

Small parts of zinc alloy may be quickly and economically cast, using low cost single-cavity dies operating at high speed, with the model



M55A/HF air operated die casting machine, announced by DCMT Sales Corp., 315 Broadway, New York 23, N. Y. It can maintain a production rate of 20,000 shots per week. Pot of machine uses hydraulic suction to fill the cylinder. Porthole in base of pot allows use of all the metal before refilling. Ejector boxes are of quick-release type.

Features include optional hand and foot controls and a new air system with pilot and ram valves integral. Toggle links are forged clevis hardened steel. The machine carriage is undercut for downpulls and ejecting large castings. Base plate is adjustable to allow use of die blocks of any required thickness.

Check No. 3 on Reply Card for more Details

Drilling Machine

Drilling, reaming and counterboring is a one-man operation with the Togglebug portable drill press, built by Guibert Steel Co., P.O. Box 1837, Pitts-

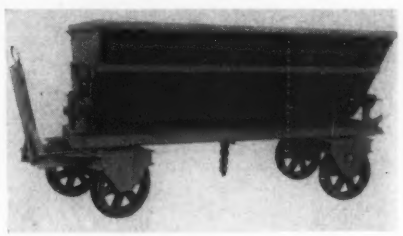
burgh 30, Pa. Improvements in the model MC unit include multiple or constant speed types, the latter being convertible by means of a flexible coupling to a multiple speed model; ability to drill upward; new frame and body; shortened overall length; reversible switch with throw lever which assists in backing out of deep holes.

Unit's control lever for cutting compound is adjustable for any desired flow. Compound tank is located within the body. Drill operates at a high speed of 385 revolutions per minute. Maximum drill size is 1½ inches.

Check No. 4 on Reply Card for more Details

Side Dump Trailer

Made in two styles, one with gear type dumping rockers and one with automatic coupler for train hauling, the new side dump trailer truck man-



ufactured by Palmer-Shile Co., 16025 Fullerton Ave., Detroit 27, Mich., may be used for collecting, hauling and dumping a variety of materials. Gear type dumping rockers provide easy operating and smooth action, with no mechanism to wear out.

Dumping is controlled to either

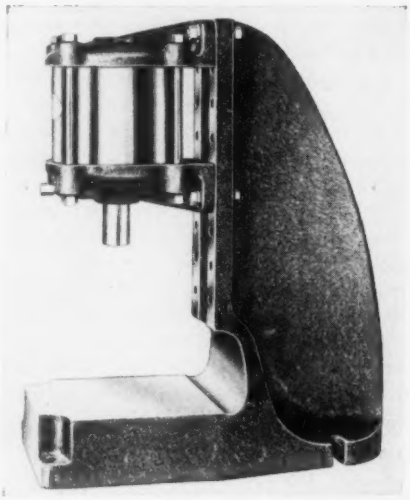
right or left side. Automatic coupler is standard equipment. It permits use of this trailer in train hauling, each unit being made to trail perfectly in train and in turning corners. Fifth wheel construction aids in making short turns. Trailer has four 18 x 3½-inch metal roller bearing wheels with molded or rubber tires.

Check No. 5 on Reply Card for more Details

Air Press, Vise

Two new controlled air power devices, a model DVH-150 air-hydraulic vise and a model BAP-20 arbor press, are announced by Bellows Co., Akron, O. The vise develops a clamping pressure of 150 times the operating air line pressure from any air line pressure up to a maximum of 125 pounds. Jaw opening is adjustable from a fraction of an inch to 5 inches in increments of 1/32-inch through a locking adjusting nut on the hydraulic ram. In addition to the 6-inch wide hardened steel jaws, it is equipped with soft steel false jaws. Power is obtained from an air motor in combination with a built-in hydraulic intensifier.

Light to medium pressing operations such as forming, flaring, stamping, riveting, etc., may be performed on the arbor press (illustrated). It is powered by a 5 1/2-inch bore air



cylinder which develops a thrust of approximately 20 times operating air line pressure. Line pressure may vary from 5 to 175 pounds. A built-in speed control valve permits infinite variation in speed of advance stroke which varies in length from a fraction of an inch to 2 1/2-inches. Maximum clearance of 1 1/4-inch ram shaft is 7 inches; table size is 8 x 9 inches and throat clearance is 5 inches. Various types of controls are offered for both vise and press.

Check No. 6 on Reply Card for more Details

Temperature Recorder

Temperature gradients may be determined in continuous porcelain enameling furnaces with the new 3-point temperature recording instrument introduced by Ferro Enamel Corp., 4150 East 56th St., Cleveland 5, O. Unit can be used on the smallest of continuous furnaces—on any chain center from 16 to 32 inches without a major tool revision on the furnace chain.

The recorder is 20 per cent lighter and has 22 per cent less volume than the previous model. Battery sources for operation are materially improved.

Check No. 7 on Reply Card for more Details

Pallet Truck

All controls, including the brake, are incorporated in the single transmission lever of the model DF Pallet Toter, built by Truck-Man Inc., 1401 Ganson St., Jackson, Mich. Speeds in

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HI-GRADE METALLIC SHOT AND GRIT

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- LACKS IRREGULAR SHAPES

- RECTANGULAR
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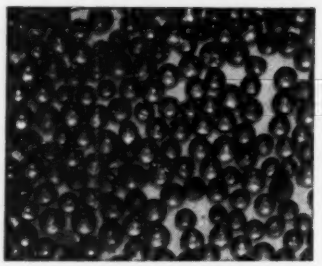
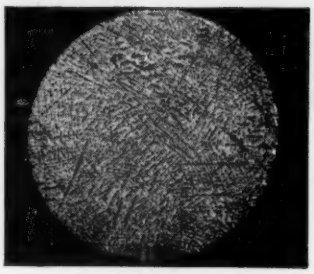
- DURABLE



UNRETOUCHED PHOTO OF HI-GRADE SHOT

CLAYTON-SHERMAN ABRASIVES COMPANY
3896 LONYO ROAD
DETROIT 10, MICHIGAN
CEdar 7200



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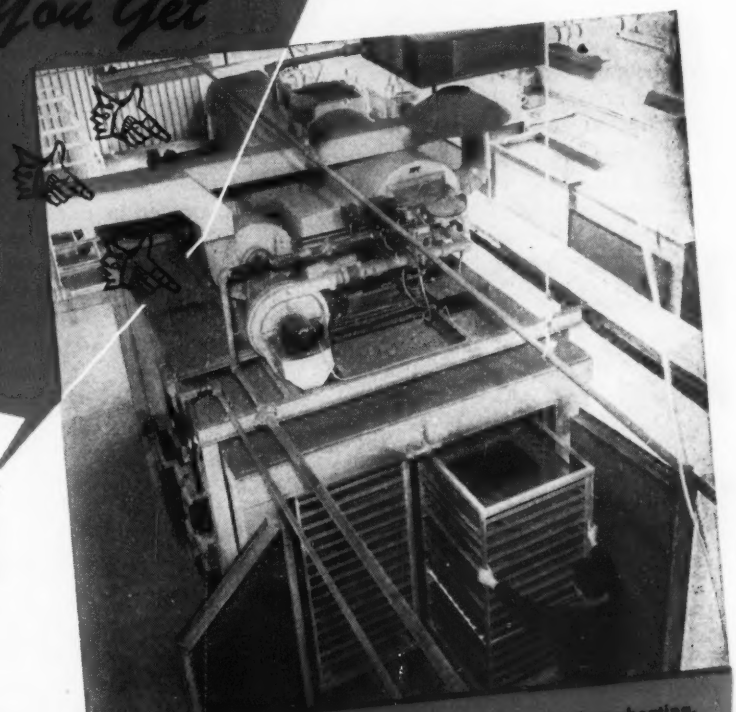
Here's the Reason You Get

QUALITY And SPEED From DESPATCH

Finish Baking Ovens



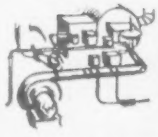
Bird's-eye view shows compactness of high volume heating, air circulating and ventilating system.

Note arrangement of adjustable tip-in ports in interior ducts to permit uniform heat distribution throughout oven.

Modern enamels are designed to polymerize at definitely established temperatures and cycles. DESPATCH Finish Baking Ovens provide a reliable cycle that adheres closely to laboratory specifications. High speed production of finer finishes is assured with development of several important DESPATCH features.

Heater-Duct Design Improves Oven Performance. DESPATCH engineers have had long experience designing equipment for varying temperatures to obtain maximum efficiency and minimum heat loss. To achieve top efficiency they balance heater capacity and fan velocity with the duct. Then they distribute the properly heated air *as needed* for uniformity to all parts of the work chamber by means of correct spacing of special DESPATCH "tip-in" ports.

More High Speed High Volume Heat Transfer. The DESPATCH Heavy Duty Fan is responsible for movement of large volumes of heated air necessary to cover every square inch of finished surface and maintain a high rate of heat transfer. DESPATCH all-welded fans are dynamically and statically balanced and built to operate under extreme heating and cooling conditions.



Despatch Low Pressure Heaters. To process white or other light finishes with highest possible heater efficiency, a DESPATCH gas-fired, low pressure heater is recommended for perfect combustion under all conditions. Clean finishes and maximum fuel economy are assured.

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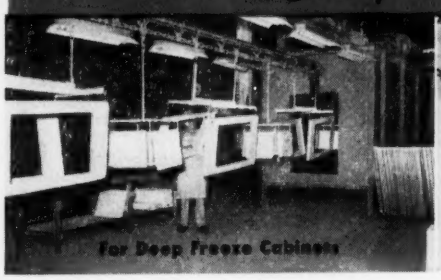
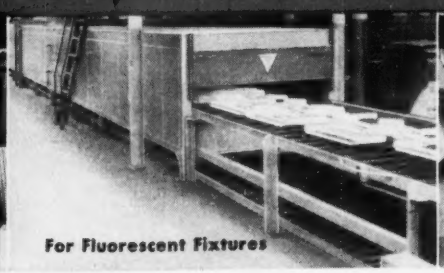
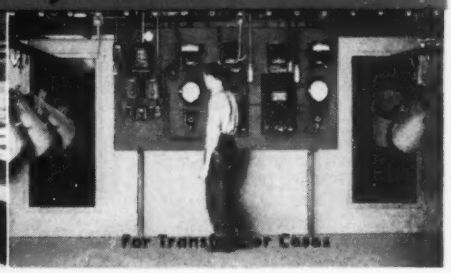


For Deep Freeze Cabinets



For Fluorescent Fixtures



For Transformer Cases

either direction are from creeping to 3 miles per hour. Feature of the truck is the ratio of truck weight (920 pounds) to pay load capacity (3000 pounds), which makes possible economy of operation. It is gasoline powered by the AB 3 horsepower Wisconsin motor.

Design is based on a pneumatic tired power turret which provides

turning within its own length. The operator rides with the load. Rubber insert load wheels soften the jolts on rough factory floors. Currently made truck has 48-inch forks, making it capable of handling most pallets now in use. Other sizes of this truck are available.

Check No. 8 on Reply Card for more Details

Needle Bearing Top Roll

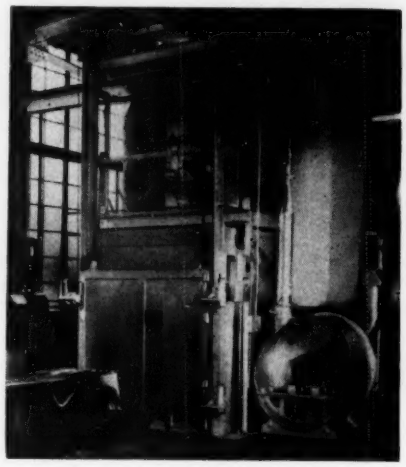
Torrington Co., Torrington, Conn., has developed a new line of needle bearing top rolls for use in various positions on roving and spinning frames. The compact units are dimensionally interchangeable with other types of top rolls. Small outside diameter in relation to bore of needle bearings allows use of large arbor which gives freedom from deflection, yet provides adequate cross section for a durable shell and housing.

Four rubber seals prevent leakage of lubricant. Labyrinth seals prevent accumulation of dirt between shell and arbor. Unit requires no adjustment and infrequent servicing.

Check No. 9 on Reply Card for more Details

Aluminum Annealing Oven

Three thousand pounds of coil or sheet aluminum per hour may be annealed at an operating temperature of 850° F in the aluminum annealing oven built by Gehnrich Oven Division of W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn. With a work chamber 5 feet 6 inches wide, 19 feet 3 inches long and 5 feet 11 inches high, the oven is of insulated dual panel assembly with interior chamber sheathing of stainless steel and exterior of black steel. Counter-



weighted, chain operated lift doors are located at both ends.

Heating and recirculating system is located directly over the oven. It is heated by an external air heater fired by a combination oil-gas burner having ratiotrols to proportion the required amount of fuel with the air supplied by a turbo-blower. Heated air is drawn from air heated by fan

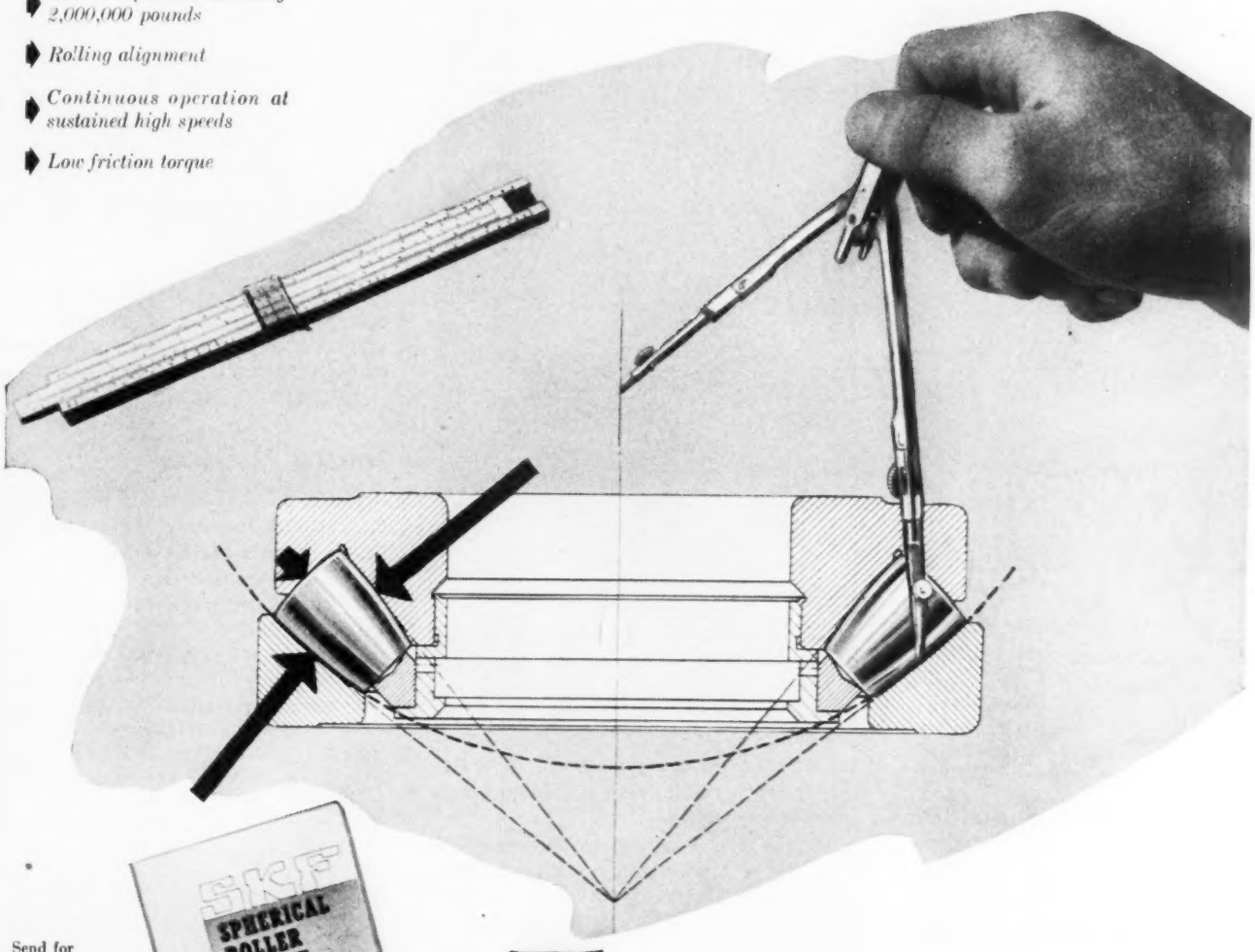
STEEL
FOR THE OIL BUSINESS
Link three names together—Steel, AVONDALE, and Oil . . . and you have forged a chain of industrial progress. Steel is the material from which AVONDALE makes tools for the Oil Industry.
Pipe jackets for constructing Oil Well Drilling platforms in the Marine Fields off Louisiana. Designed by J. Ray McDermott & Co., Inc.
STEEL
AVONDALE MARINE WAYS, INC.

ENGINEERED BY SKF TO CARRY

HEAVY THRUST LOADS

at high speeds!

- *Thrust capacities exceeding 2,000,000 pounds*
- *Rolling alignment*
- *Continuous operation at sustained high speeds*
- *Low friction torque*



Send for CAT. 379

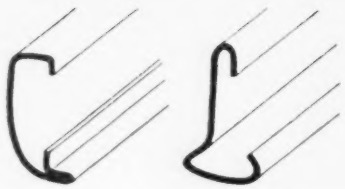
The SKF Spherical Roller Thrust Bearing is designed to carry heavy thrust loads at sustained high speeds. This high capacity is not reduced by misalignment between shaft and housing bore, since the outer race of the bearing is a section of a sphere on which the inner race and spherical roller assembly align freely.

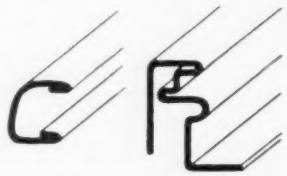
The rollers are so shaped that load components firmly contact the roller ends against the unusually high guide flange. This assures positive guiding of the rollers without excessive pressure on the roller ends.

The bearing is so constructed that oil is pumped outwardly between the rollers, bathing all parts of the bearing in lubricant. 6454

SKF INDUSTRIES, INC., PHILA. 32, PA.

ROLLS





DESIGNERS & BUILDERS

of

Metal Forming Rolls for Mouldings & Structural Sections .010" to .062" Aluminum, Brass, Cold Rolled Steel & Stainless Steel

ESTABLISHED 1938

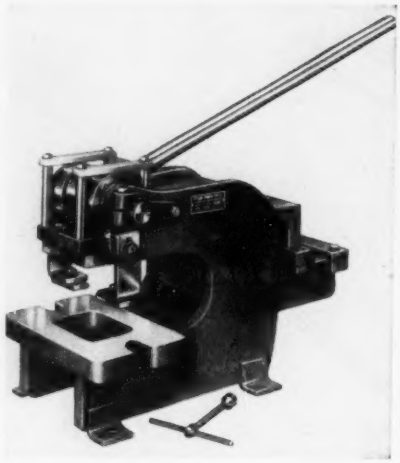
ACME ROLL CO.
2717 E. Larned Street
Detroit 7, Michigan

into work chamber. Return ducts are located along top of the work chamber at each side wall. Safety protection against flame failure is provided by shut-off valves for either fuel in event of air or fuel line failure. Fan and motor are protected by means of a high temperature limit switch.

Check No. 10 on Reply Card for more Details

Blanking Press

Of steel and welded construction, the improved model A blanking press, made by Leslie Welding Co., 2943 Carroll Ave., Chicago 12, Ill., is adapted to blanking operations on sheets of any type material. With no



ram, ways or slides it has the accuracy of a leader pin die set. Die alignment is maintained by the aligning leaf assembly, to one end of which the punch is fastened. The other end is attached to the press frame by a flat spring serving as a pivot when punch is raised and lowered.

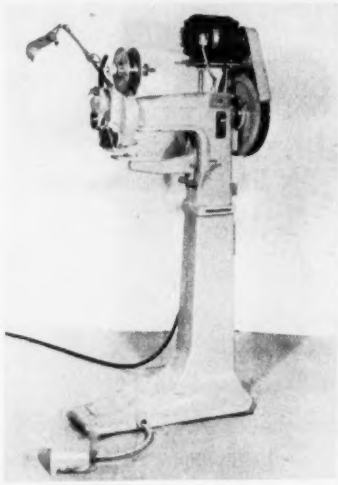
Press is designed to accommodate most blanking punches. Punch plate is 4 inches front to back and 4⅜-inches right to left. Press has a throat depth of 6 inches, a stroke of 7/16-inch, with adjustment of 1/8-inch. Die space, stroke down and adjustment up, is 4 1/4-inch. Hole in bed is 3 1/8 x 4 1/2-inches. Press capacity is 3-inch diameter through 16-gage mild steel or 2-inch diameter through 12-gage mild steel.

Check No. 11 on Reply Card for more Details

Heavy Frame Stitcher

Added sturdiness is given to the model S-13-C metal stitcher, made by Bostitch Inc., 399 Mechanic St., Westerly, R. I., by a new heavy frame. The stitcher, used for stitching steel, aluminum or other metals, metal to metal, or to other materials, has a new solenoid control which is adjustable for single or continuous operation. This foot operated switch gives added speed and safety.

Single 1/16-inch sheets of cold rolled steel or multiples up to 0.070-inch

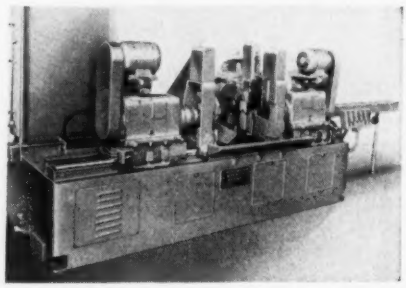


thickness may be stitched. Machine, equipped with a 1/2-horsepower, 1725 revolutions per minute motor, requires a floor space 16 x 40 inches.

Check No. 12 on Reply Card for more Details

Transfer Machines

Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, O., is manufacturing a line of four double-end transfer machines which saw the work piece to length and quickly transfer it into position for machining both ends while the second piece is being cut off. The four models will accommodate 1¼-inch solid



stock or 2-inch tubing, 3-inch solid or tube stock, 4-inch solid or tube stock and 6-inch solid or tube stock.

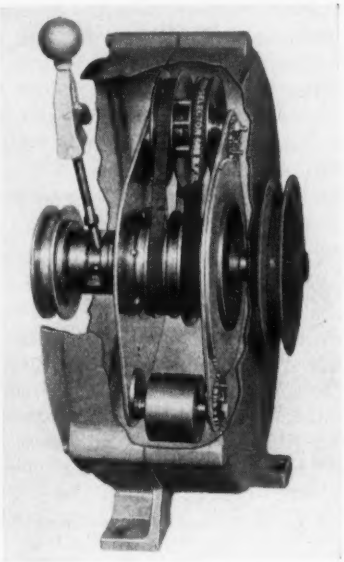
Stock is fed automatically, cut off with square ends within plus or minus 0.001-inch and to accurate lengths of plus or minus 0.004-inch. The following machining operations can be handled: Chamfering both ends, center drilling both ends, center drilling and chamfering both ends, threading both ends to a reasonable length, trepanning one or both ends, turning one or both ends with box tool, chamfering outside and inside diameters of tubing, reaming one or both ends

of tubing and chamfering inside diameter and reaming both ends of tubing.

Check No. 13 on Reply Card for more Details

Speed Selector

A 5 horsepower speed control, made by Speed Selector Inc., 118 Noble Ct., Cleveland 13, O., has a variable speed drive which utilizes the principle of planetary motion in combination with standard V-belts and variable pitch sheaves. Infinite ratio, split-second



control of speeds from 0 to 800 revolutions per minute and into reverse where needed, are provided.

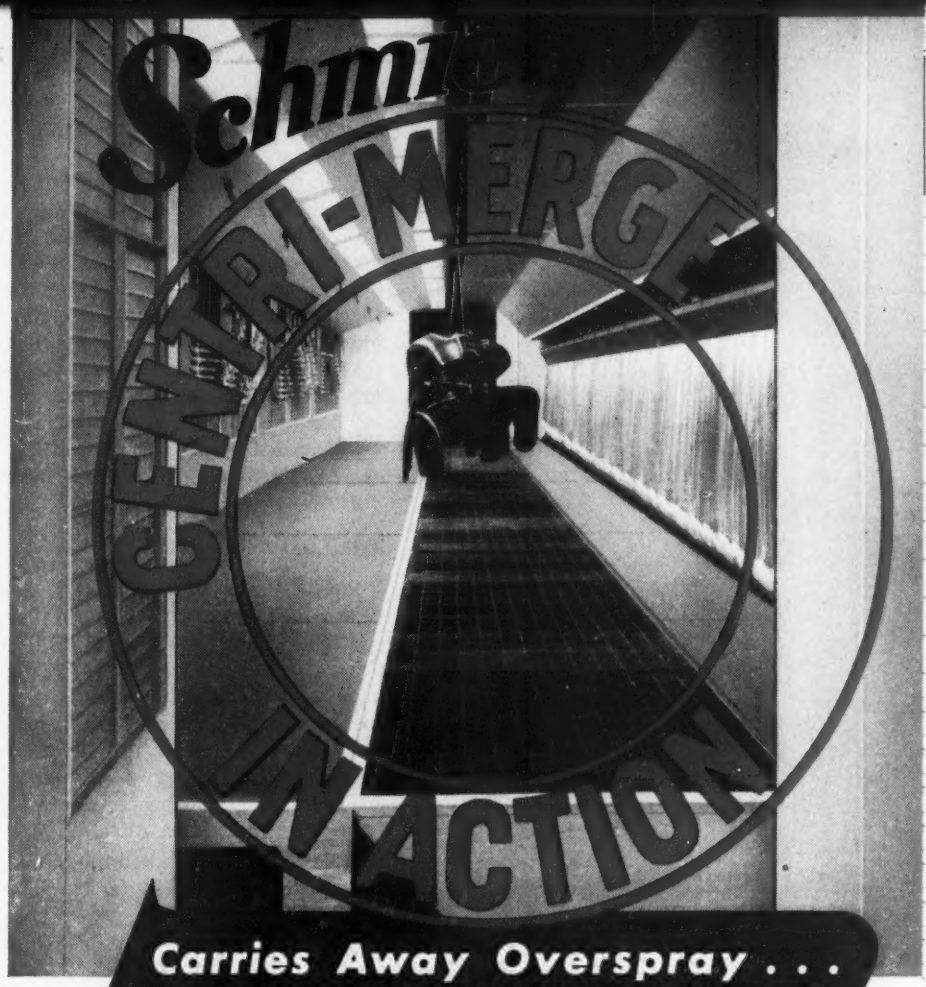
Units have cast iron sheaves on hardened and ground shafts and guide pins with sealed prelubricated ball bearings mounted in strong, light cast aluminum housings. Optional V-belt or flexible coupling input and output make the speed selector adaptable for mounting in any position on new or existing equipment.

Check No. 14 on Reply Card for more Details

Multispindle Drillers

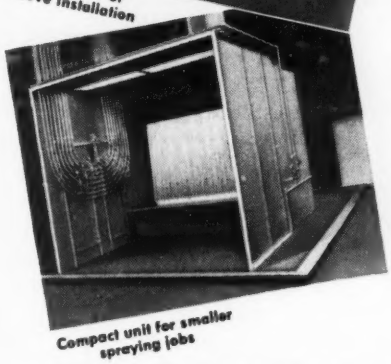
Electrically controlled hydraulic feed systems, providing infinite feed range and pick-off type change gears to permit a wide selection of spindle speeds are features of the model C2B, C3B and C4B Natco Holesteel adjustable multispindle drillers and tappers, built by National Automatic Tool Co., Richmond, Ind. Each model can be supplied with either of two bases, both being similar except for size of working area. Model C2B and C3B machines can be supplied with an adjustable knee type work table. Entire assembly has a vertical adjustment of about 12 inches.

Heavy box section column prevents



Carries Away Overspray . . .
IN A WHIRLING TORNADO OF WATER

Exterior view of above installation



Compact unit for smaller spraying jobs

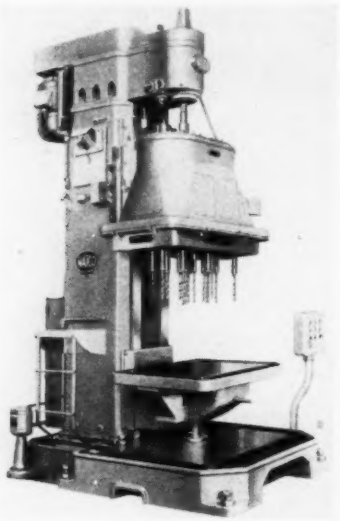
Consult Schmieg engineers regarding your problems of dust and fume control.

PAINT-LADEN AIR IS "TORNADO" CLEANED. Operators, working in a Schmieg Centri-Merge Spray Booth, are adequately protected from fire and fumes. Overspray is carried on an air stream *horizontally* away from work into a curtain of water, pressure-fed through slots extending continuously full width of booth, that descends down the flood sheet. The mixture of fume and paint-laden air and water is then whirled under the flood sheet and hurled with tremendous impact against the impingement wall at back of booth. Down this impingement wall flows an additional sheet of water that floods the foreign matter, pounded out in the process, into the sludge tank below. Only CLEAN AIR passes through exhaust fan. Thus the danger of fire is suppressed both in front and behind the flood sheet. Because the ratio of water and air is far greater in Centri-Merge, paint and other gummy substances do not pile up on the hard-to-get-at walls of the chamber behind the flood sheet; therefore, cost of repeated cleanings is eliminated.

THE *best* AIR PURGE *is* CENTRI-MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers
298 PIQUETTE AVENUE • DETROIT 2, MICHIGAN

deflection. Ways are of close grain high tensile cast iron. Neck is an antifriction cascade lubricated gear chest driven by V-belts from a foot-mounted vertical motor. A shift lever operates a sliding gear which provides a 2.5 to 1 gear change. Adjustable spindle heads are of anti-

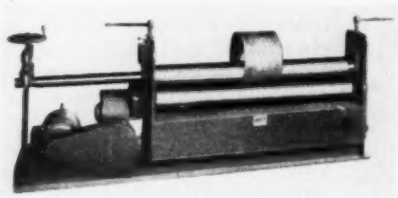


friction mounted construction, in which each spindle drive has independent spindle speed change gears. Spindle may be located in any position within area of the head and a drive angle of 35 degrees or less. Tapping adjustment consists of a manual head feed arrangement working with an electrical reversing control to the head motor.

Check No. 15 on Reply Card for more Details

Bending Rolls

High roll clearance between the top and lower rolls to permit the rolling of heavy bars and light structural shapes as well as plates is a feature



of the series 650 pyramid type bending rolls, designed by Reed Engineering Co., 1003 West Fairview Ave., Carthage, Mo. The two lower rolls are spaced closely together to minimize the flat spot. All main rolls are forged steel and the top roll is 7½ inches in diameter and the lower rolls are 6½ inches in diameter.

Standard equipment includes: Bronze bearings throughout, silent worm gear drive, top roll indicators, electric reversing control for the direct motor drive, antitorque frame and ratchet wrench adjustment of the top roll. It is built with drop end construction which permits removal of fully rolled circles from the top roll. The 5 horsepower driving motor operates the rolls at about 18 feet per minute. Magnetic brake motors for instant stopping and reversal, a 7½-horsepower motor and magnetic reversing controls are optional. Four models with capacities from 4 feet by 7/6-inch to 8 feet by ¼-inch are made

Check No. 16 on Reply Card for more Details

Switch Rotor

Multiple wiping blades of the new type rotor for line of attenuators and switches made by Daven Co., 191 Central Ave., Newark, N. J., are made of a special silver alloy and are enclosed in a tamperproof housing. Each blade conductor is individually spring loaded, giving a knee-action effect in use, producing uniform pressure on contacts and slip ring.

The shorter rotor arms lower overall switch resistance, due to short conducting path. Stray capacity coupling between switch sections is decreased. With this type of switching arrangement, it is possible to procure more circuits on one deck than previously. Switches having up to six poles on one deck, in a 2¾-inch diameter unit, are available.

Check No. 17 on Reply Card for more Details

• • •

BARREL TRUCK: Automatic loading is a feature of the new barrel truck designed to handle loads up to 1000 pounds by Palmer-Shile Co., Detroit 27, Mich. Truck is loaded by shoving it against barrel or drum, dropping sliding steel catch over rim and pulling back to traveling position. Maximum truck width is 22 inches.

Check No. 18 on Reply Card for more Details

STEEL PANEL BOARDS: Constructed of 10-gage steel, standard size, sectional steel panel boards, made by K & H Industrial Products, Akron 11, O., provide sturdy, rigid support for precision instrument operation. Smooth contour panels are made in 18, 20 and 24-inch widths and 6, 6½, 7, 7½ and 8-foot heights.

Check No. 19 on Reply Card for more Details

ARMORED TUBING: Samuel Moore & Co., Mantua, O., is announcing a new color armored tubing, sold as Rub-Bub, which is generally an electric-welded steel tube covered with a 1/32-inch coating of plastic color armor. Color armor can be deposited on any diameter steel, aluminum or magnesium tube by an extrusion process. It will resist violent shocks without cracking or peeling and will maintain elasticity from minus 30° to plus 90° F.

Check No. 20 on Reply Card for more Details

VIBRATION CONTROL: Chan-L-Mount, manufactured by Lord Mfg. Co., Erie, Pa., is a packaged vibration control with a heavy cushion of soft rubber which prevents metal-to-metal bottoming under occasional shock. A deflection of 1/4-inch isolates frequencies as low as 600 cycles per minute, in addition to all higher frequencies. Mounting is 1½-inches high and is installed by sliding under machine.

Check No. 21 on Reply Card for more Details

CURED RACK COATING: A tough, smooth coating is produced by Micrcosol E- 1003, a single dip heat cured rack coating developed by Michigan Chrome & Chemical Co., 6340 East Jefferson Ave., Detroit 7, Mich. It combines good insulation, permanent flexibility, continuous adhesion and good scuff resistance and is nonporous.

Check No. 22 on Reply Card for more Details

WIRE MARKERS: Western Lithograph Co., Los Angeles, Calif., is manufacturing E-Z Code wire markers for identifying raw metals. They are tough self-adhesive strips that adhere to any metal surface and are unaffected by moisture, temperature or handling. Printing is in fadeproof ink to manufacturer's code.

Check No. 23 on Reply Card for more Details

DRAFTING MACHINES: Feature of improved standard and civil engineer's drafting machines made by Charles Bruning Co. Inc., Chicago 41, Ill., is the Equipoise mechanism which insures accurate alignment at all times on an inclined drawing board. Other features include revised protractor head assembly, relocated base line setting device for locking protractor index point to any angle.

Check No. 24 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

PRICES— Increases in steel prices appear imminent but they are expected to be accepted complacently by consumers. Their prime interest is supply; prices are secondary, as borne out by gray market sales, conversion deals, outright purchases of steel production and finishing facilities at high prices, and an absence of complaint over the fact all steel companies did not lower their prices after U. S. Steel Corp. made reductions in May.

Steel consumers are aware steel production costs are being pushed up by higher railroad freight rates and that coal costs will be higher; so they are resigned to the fact the wage advance for which steelworkers have been driving will be the trigger that touches off the steel advance.

It is reported from the steel industry that elimination of the recent price reductions will not be sufficient to cover increased costs. Consequently, the steel producers which in May stood pat on prices are expected to have to move this time—upward.

BASING POINT— There is some conjecture an upward price revision might coincide with the adoption by the steel industry of an f.o.b. mill pricing basis. This would suggest the general adoption of such a pricing basis is not far away. In fact some people within the steel industry say that in view of the Federal Trade Commission's recent successes in attacks on multiple basing point systems and delivered prices the obligatory adoption of an f.o.b. mill pricing system for steel is much nearer than most people realize.

Meanwhile, there was little change on the price front last week, although leading refractory brick producers raised prices 5 to 10 per cent to offset increased production costs. STEEL'S arithmetical price composites last week were unchanged from those of the preceding week. Compared with those for the corresponding 1947 week they are: Finished steel, $80.27 and $69.82; semifinished steel, $68.62 and $52.10; steelmaking pig iron, $40.49 and $32.49; and steelmaking scrap, $40.67 and $35.08.

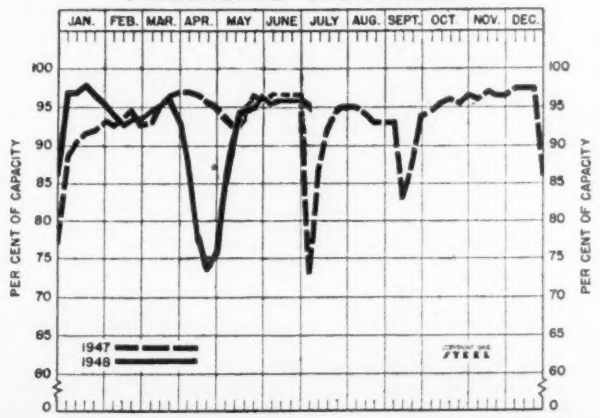
ALLOCATIONS— With supply uppermost in mind as far as steel is concerned, consumers, and the steel industry too, have been keenly appraising the new draft act rider authorizing mandatory government controls on steel. Their consensus, in view of the coming presidential election, is that the controls will not be invoked before then, and also not thereafter if there is a change in administrations, provided there is no sudden international crisis.

PRODUCTION— Meanwhile, steel ingot production continued at a high level last week, totaling about 1,715,000 tons, although the estimated national rate eased down one point to 95 per cent of capacity, reflecting a slight reduction at Weirton, W. Va., and a complete shutdown at Wheeling Steel Co.'s works at Benwood, W. Va. This lowered Wheeling district's rate 11 points to 85.5 per cent. Lesser declines were reported as 7½ points to 82 per cent in St. Louis, 4 points to 90.5 per cent in Cleveland, 2 points to 79 per cent in New England, 1 point to 95 per cent in Chicago, and ½ point to 90 per cent in eastern Pennsylvania. However, steel ingot output at Buffalo rose 2 points to 101 per cent and at Pittsburgh, 1 point to 95.5.

WAREHOUSES— With mill delivery dates for alloy steel now well toward the end of the year, consumers who ordinarily would buy that product from the mills are turning to warehouses in increasing numbers. Demand for stainless is also good, and there is no indication of a break in pressure for carbon steel products.

VACATIONS— However, some consuming plants which have closed for mass vacations have advised steel mills to suspend or delay shipments meanwhile. On the other hand some consumers have asked producers, who have tonnage ready to move, to send it on and let railroad car demurrage charges accumulate.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended July 3	Change	Same Week 1947	Same Week 1946
Pittsburgh	95.5	+ 1	59	97
Chicago	95	— 1	93	88
Eastern Pa.	90	— 0.5	84	85
Youngstown	102	— 1	40	84
Wheeling	85.5	—11	63	90.5
Cleveland	90.5	— 4	42.5	89
Buffalo	101	+ 2	88.5	88.5
Birmingham	100	None	87	99
New England	79	— 2	85	45
Cincinnati	102	None	72	81
St. Louis	82	— 7.5	82	54.5
Detroit	103	None	92	85
Estimated national rate	95	— 1	73	88

Based on weekly steelmaking capacity of 1,802,476 net tons for 1948; 1,749,928 tons for 1947; 1,762,381 tons for 1946.

News Summary—P. 41 *Engineering News—P. 71*

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	July 3	June 26	Month Ago June 1948	Year Ago July 1947	5 Years Ago July 1943
Finished Steel	$80.27	$80.27	$80.27	$70.80	$56.73
Semifinished Steel	68.62	68.62	68.62	53.04	36.00
Steelmaking Pig Iron	40.49	40.49	40.49	33.82	23.00
Steelmaking Scrap	40.67	40.67	40.67	37.23	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

June 1948	3.59296c
May 1948	3.59469c
June 1947	3.12729c
June 1943	2.47708c

***STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide base prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading basing points), and on Steelworks Scrap (No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

†**FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, base prices, weighted by actual monthly shipments of following products, representing 83 per cent of total steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. May and June, 1948, figures are preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton; others dollars per gross ton.

Finished Materials

	July 3 1948	June 1948	Apr. 1948	July 1947
Steel bars, Pittsburgh	2.875c	2.875c	2.90c	2.66c
Steel bars, del. Philadelphia	3.365	3.365	3.356	2.98
Steel bars, Chicago	2.875	2.875	2.90	2.66
Shapes, Pittsburgh	2.775	2.775	2.80	2.56
Shapes, del. Philadelphia	2.98	2.98	2.968	2.64
Shapes, Chicago	2.775	2.775	2.80	2.56
Plates, Pittsburgh	2.925	2.925	2.95	2.71
Plates, del. Philadelphia	3.21	3.21	3.19	2.85
Plates, Chicago	2.925	2.925	2.95	2.71
Sheets, hot-rolled, Pittsburgh	2.775	2.775	2.80	2.56
Sheets, cold-rolled, Pittsburgh	3.50	3.50	3.55	3.27
Sheets, No. 10 galv., Pittsburgh	3.90	3.90	3.95	3.63
Sheets, hot-rolled, Gary	2.775	2.775	2.80	2.56
Sheets, cold-rolled, Gary	3.50	3.50	3.55	3.27
Sheets, No. 10 galv., Gary	3.90	3.90	3.95	3.63
Strip, hot-rolled, Pittsburgh	3.05	3.05	3.05	2.56
Strip, cold-rolled, Pittsburgh	3.775	3.775	3.80	3.27
Bright basic, bess, wire, Pittsburgh	3.725	3.725	3.775	3.475
Wire nails, Pittsburgh	5.125	5.125	5.20	3.975
Tin plate, per base box, Pittsburgh	$6.60	$6.60	$6.70	$5.75

Semifinished

Sheet bars, Pittsburgh, Chicago	$60.00	$60.00	$60.00	$47.50
Slabs, Pittsburgh, Chicago	45.00	45.00	45.00	38.92
Rerolling billets, Pittsburgh	45.00	45.00	45.00	38.92
Wire rod 5/32 to 1/4-inch, Pitts.	3.175c	3.175c	3.175c	2.63c

Pig Iron

	July 3 1948	June 1948	Apr. 1948	July 1947
Bessemer, del. Pittsburgh (N.&S. sides)	$44.08	$44.08	$40.996	$36.03
Basic, Valley	39.00	39.00	39.00	34.20
Basic, eastern del. Philadelphia	42.17	42.17	42.004	36.47
No. 2 fdry., del. Pgh. (N.&S. sides)	43.58	43.58	40.496	35.53
No. 2 fdry., del. Philadelphia	42.67	42.67	42.504	37.21
No. 2 foundry, Chicago	39.00	39.00	39.00	34.20
No. 2 foundry, Valley	39.50	39.50	39.50	34.70
Southern No. 2, Birmingham	39.38	39.38	37.88	31.98
Southern No. 2, del. Cincinnati	45.09	45.09	42.23	36.85
Malleable, Valley	39.50	39.50	39.50	34.70
Malleable, Chicago	39.50	39.50	39.50	34.70
Charcoal, low phos., fob Lyles, Tenn.	58.00	58.00	55.00	43.00
Ferromanganese, fob cars, Pittsburgh	151.00	151.00	151.00	140.25

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$40.25	$40.25	$40.25	$37.20
Heavy melt. steel, No. 2, E. Pa.	39.00	39.00	39.00	38.06
Heavy melt. steel, No. 1 Chicago	39.25	39.25	39.10	35.95
Heavy melt. steel, No. 1, Valley	40.25	40.25	40.25	37.35
Heavy melt. steel, No. 1, Cleveland	39.75	39.75	39.75	37.65
Heavy melt. steel, No. 1, Buffalo	44.00	43.00	43.00	37.90
Rails for rerolling, Chicago	54.50	53.75	49.50	43.20
No. 1 cast, Chicago	68.50	68.38	68.40	41.10

Coke

Connellsville, beehive furnace	$13.00	$13.00	$12.55	$11.20
Connellsville, beehive foundry	15.50	15.22	14.875	13.05
Chicago, oven foundry, del.	20.75	20.75	19.25	17.46

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $90-$95 per gross ton. Forging quality $46 per net ton, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, $56 per gross ton.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Buffalo, Birmingham, $45 per net ton; Cleveland, $47 per net ton; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, $54 per net ton.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $66 per gross ton.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Youngstown, $60 nom., per net ton; sales in open market $95-$105 per gross ton.

Skelp: Pittsburgh, 2.85-2.90c; Youngstown, 2.90c per lb.

Tube Rounds: Pittsburgh, Chicago, Gary, Cleveland, $69-70 per net ton; some sellers quoting up to $120 per gross ton.

Wire Rods: Pittsburgh, Chicago, Birmingham, 5/32 to 1/4-in., inclusive, $2.80-3.55 per 100 lb. 5/32 to 47/64-in., inclusive, $2.75, Cleveland; Galveston, $2.95; Worcester, $2.90-2.95. San Francisco (base del.), $3.5245.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in. (Base 20 tons one size): Pittsburgh, Youngstown, Chicago, Gary, Birmingham, 2.85-2.90c; Cleveland, Buffalo, 2.90c; Detroit, del., 3.11c; eastern Mich., 3.18c; New York, del., 3.43c; Phila., del., 3.34-3.39c; San Francisco (base, del.), 3.5845-3.95c; Los Angeles (base, del), 3.579-3.86c; Seattle, 3.8375-3.85c, base.

Rail Steel Bars: Same basing points as merchant carbon bars. Prices upon application.

Hot-Rolled Alloy Bars (Base 20 tons one size): Pittsburgh, Youngstown, Chicago, Gary, 3.20-3.30c; Canton, Massillon, Buffalo, Bethlehem, 3.30c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars (Base 40,000 lb): Pittsburgh, Chicago, Gary, Cleveland, Buffalo, 3.45-3.55c; Detroit, del. 3.61c; Toledo, 3.68c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Cleveland 4.00-4.10c; Gary, Buffalo, Canton, base 4.10c.

Reinforcing Bars (New Billet): Pittsburgh, 2.70-2.75c; Chicago, Gary, Youngstown, Birmingham, 2.70c; Sparrows Point, Buffalo, base 2.75c; San Francisco (base, del.), 3.3345c; Los Angeles (base, del.), 3.329c; Seattle, 3.88c-4.18c base.

Iron Bars: Single refined: Pittsburgh 7.70c (hand puddled), Economy, Pa., 8.65c. Double refined: Pittsburgh 9.75c (hand puddled), Economy, Pa., 10.00c. Staybolt: Pittsburgh 11.25c (hand puddled), Economy, Pa., 10.20c.

Sheets

Hot-Rolled Sheets (18 gage and heavier): Pittsburgh, Chicago, Gary, Birmingham, Youngstown, 2.75-2.80c; Cleveland, Buffalo, Sparrows Point, Ashland, Ky., base, 2.80c; Detroit, del., 3.01c; eastern Mich., del., 3.08c; Philadelphia, del., 3.06c; New York, del., 3.18c; Los Angeles (base, del.), 3.494-3.544c; San Francisco, (base, del.) 3.4995-3.5495c. (Alan Wood Steel Co., Conshohocken, Pa., quotes 4.20c, Sparrows Point equivalent).

Cold-Rolled Sheets: Pittsburgh, Chicago, Gary, 3.45-3.55c; Cleveland, Middletown, 3.50-3.55c; Buffalo, Youngstown, Sparrows Point, 3.55c; Granite City, 3.65c; Detroit, del., 3.66-3.76c; eastern Mich., del., 3.73-3.83c; New York, del., 3.93c; Philadelphia, del., 3.81c.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Gary, Birmingham, 3.85-3.95c; Chicago, Sparrows Point, Canton, Middletown, 3.95c; Kokomo, 4.55c; Youngstown, 3.95-4.45c; Granite City, 4.35c; New York, del., 4.33c; Philadelphia, del., 4.21c; Los Angeles (base, del.), 4.624c; San Francisco (base, del.), 4.6295c.

Corrugated Galvanized Sheets, No. 10 (Based on 5-cent zinc): Pittsburgh, Chicago, 3.95-4.05c; Gary, Birmingham, Canton, Youngstown, Middletown, 3.95c.

Culvert Sheets, No. 16 flat (based on 5-cent zinc; corrugated 10 cents extra): Copper alloy: 4.45-4.55c, Pittsburgh, Gary; 4.55c Chicago; 4.90c, Kokomo; 5.00c, Granite City; 5.344c (base del.), Los Angeles; 5.3495c (base del.), San Francisco.
Copper-iron or pure iron: 4.80-4.90c, Pittsburgh; 4.80c, Gary; 4.90c, Chicago, Canton; 5.35c, Granite City.

Aluminized Sheets: Hot-dipped, coils or cut to lengths: Pittsburgh, 7.50c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 4.05c.

Enameling Sheets, No. 12: Pittsburgh, 3.85-3.95c; Chicago, Gary, 3.75-3.95c; Cleveland, Middletown, 3.85c; Youngstown 3.95c-4.45c; Granite City, 4.05c; Detroit, del., 4.16c; eastern Mich., 4.23c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.40-4.50c; Kokomo, Ind., 4.60c. Armature: Pittsburgh, 4.70-5.30c; Chicago, Gary, 4.70-4.80c; Granite City, Ill., 5.25c; Kokomo, Ind., 4.90c. Electrical: Pittsburgh, 5.20-5.80c; Chicago, Gary, 5.20-5.30c; Granite City, Ill., 5.75c; Kokomo, Ind., 5.40c. Motor: Pittsburgh, 5.95-6.80c; Chicago, Gary, 5.95-6.05c; Granite City, 6.50c. Dynamo: Pittsburgh, 6.65-7.00c; Granite City, 7.20c. Transformer 72, 7.15-8.25c; 65, 7.85-9.20c; 58, 8.55-9.90c; 52, 9.35-9.45c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, 2.80c-3.30c; Chicago, Gary, Birmingham, Youngstown, Cleveland, 2.75-2.80c; Detroit, del., 3.01c; eastern Mich., del., 3.08c; San Francisco (base, del.) 3.5595c; Los Angeles (base, del.), 3.554c.

Cold-Rolled Strip: 0.25 carbon and less: Pittsburgh, 3.50-4.05c; Cleveland, 3.45-3.85c; Youngstown, 3.55-3.85c; Chicago, Gary, 3.55-3.65c. Detroit, del. 3.66-3.76c; eastern Mich., 3.73-3.83c; Worcester, base, 3.65c.

Cold-Finished Spring Steel: Cleveland base: 0.26-0.40 carbon, 3.55c; over 0.40 to 0.60 carbon, 4.95-5.05c; over 0.60 to 0.80, 5.55-5.65c; over 0.80 to 1.05, 7.05-7.15c; over 1.05 to 1.35, 9.35-9.45c; add 0.20c for Worcester.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, per base box of 100 lb, 1.25 lb coating $6.50, 1.50 lb coating $6.70; Sparrows Point, Birmingham and Warren, O., $6.60 and $6.80, respectively; Granite City, $6.70 and $6.90, respectively.

Electrolytic Tin Plate: Pittsburgh, Gary, per base box of 100 lb, 0.25 lb tin, $5.70; 0.50 lb tin, $5.90; 0.75 lb tin $6.10; Sparrows Point, Birmingham and Warren, O., $5.80, $6.00, $6.20, respectively; Granite City, $5.90, $6.10, $6.30, respectively.

Can Making Black Plate: Pittsburgh, Gary, per base box of 100 lb, 55 to 70 lb basis weight, $5.10; 75 to 95 lb basis weight, $5.00; 100 to 128 lb basis weight, $5.10. Birmingham and Warren, O., $5.20, $5.10, $5.20, respectively.

Holloware Enameling Black Plate: Pittsburgh, Chicago, Gary, base 29-gage, 4.65c per lb; Sparrows Point, Warren, O., 4.75c; Granite City, 4.85c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, per base box of 100 lb, $5.80; Birmingham, Sparrows Point, $5.90; Granite City, $6.

Roofing Ternes: Pittsburgh, per package 112 sheets; 20 x 28 in., coating I.C. 8-lb $15.30.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, 2.90-2.95c; Cleveland, Sparrows Point, 2.95c; Coatesville, 3.45c; Claymont, 3.65c; Geneva, Utah, 2.90c; Det., del., 3.21c; New York, del., 3.33c; Phila., del., 3.21c; Boston, del., 3.51c; St. Louis, del., 3.269c; San Francisco and Los Angeles, del., 3.493c for sizes and grades produced at Geneva; 3.76c for sizes and grades produced at Fontana, Calif.

(Central Iron & Steel Co., Harrisburg, Pa., 5.10c, basing points.)

Floor Plates: Pittsburgh, 4.05c; Chicago, 3.95-4.05c; Gary, 3.95c; Cleveland, 4.20c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Gary, 3.70c; Coatesville, 4.80c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 24.00c.

Wrought Iron: Economy, Pa., 7.25c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, 2.75-2.80c; Buffalo, Bethlehem, 2.80c; New York, del., 3.06c; Phila., del., 2.98c; Geneva, Utah, 2.75c; Los Angeles (base, del.), 3.424-3.474c for sizes produced at Torrance, Calif.; Los Angeles and San Francisco, del., 3.343c for sizes produced at Geneva, 3.81c for sizes produced by Bethlehem in East; San Francisco, del., 3.54c for sizes produced at Fontana, Calif.

Beams, Wide Flange: Pittsburgh, Chicago, 2.70c.

Alloy Structural Shapes: Pittsburgh, Chicago, Gary, 3.45-3.55c.

Steel Piling: Pittsburgh, Chicago, Buffalo, $3.30 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds.)

Wire to Manufacturers in carloads

Bright, basic or bessemer..... *$3.45-4.00
Basic MB Spring (except Birm.).. **$4.85-4.95
Upholstery Spring (except Birm.) †$4.50-4.60

Wire Products to Trade in carloads

Wire, Merchant Quality
Annealed (6 to 8 base).....††$4.10-4.20
Galvanized (6 to 8 base).....††$4.55-4.65
(Fob Pittsburgh, Chicago, Duluth, Birmingham, per base column).

Nails

Standard, cement-coated, galvanized.. ‡91-94
Staples, polished and galvanized..... ‡‡91-94
Woven fence, 15½ gage and heavier. §97-100
Barbed wire, 80-rod spool .....§§111-113
Fence Posts (with clamps)..... ★107
Bale ties, single loop .....★★94-100

* Worcester, $3.55; Duluth, $3.50; San Francisco (base, del.) $4.4645 bright basic only.

** Worcester, $4.95; Duluth & Trenton, N.J., $5.10 (bright only); San Francisco (base del.) $5.8845.

† Worcester $4.60; Duluth and Trenton, N. J., New Haven, Conn., $4.75; San Francisco (base, del.), $5.5345 black upholstery.

†† One producer quotes 25 cents higher at Birmingham and Chicago; Worcester $4.20 annealed, $4.65 galvanized; Cleveland, annealed $4.10, galvanized $4.55; Duluth $4.10 annealed, $4.55 galvanized; Kokomo, Ind., $4.80 annealed, $5.25 galvanized; San Francisco (base, del.) $5.1145 annealed, $5.5645 galvanized.

‡ Cols. 108 and 114 also quoted Pittsburgh; Worcester, Cleveland 97; Duluth, 91; San Francisco (base, del.) 112.

‡‡ Cols. 108 and 114 also quoted Pittsburgh; Worcester 97; San Francisco (base del.) 112.

§ Col. 101 also quoted at Pittsburgh; San Francisco (base del) 120.

§§ San Francisco (base del.) 131.

★ Duluth, 104.

★★ San Francisco (base del.) 118; Chicago, Birmingham, 94-99.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.70-$2.75 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $3.05 per 100 lb; light rails (rail-steel), prices upon application. Relaying, 60 lb and over fob warehouse $60-$65 per net ton.

Supplies: Track bolts, 7.00c; heat treated, 7.25c. Tie plates $3.55-$3.65 per 100 lb, fob mill; $3.40 base. Seattle; $3.70 fob Pittsburg, Calif. Splice bars $3.75-$3.85 per 100 lb fob mill. Standard spikes, 4.85c; screw spikes, 6.75c. Axles 4.45-4.50c.

Tubular Goods

Standard Steel Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 to 2 points less on steel butt weld on sizes produced in that district.

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Butt Weld Blk.	Butt Weld Gal.
⅛	44½	17	1	52½–53½	36½–37½
¼	44½	21½	1¼	53–54	37–38
⅜	41	17	1½	53½–54½	37½–38½
½	47–48	29½–30½	2	54–55	38–39
¾	50–51	33½–34½	2½, 3	54½–55½	38½–39½

In.	Lap Weld Blk.	Lap Weld Gal.	Elec. Weld Blk.	Elec. Weld Gal.	Seamless Blk.	Seamless Gal.
2	44½	28	44	27½	43½	27
2½ & 3	48½	32	47	30½	46½	30
3½-6	50½	34	49	32½	48½	32

Line Steel Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Butt Weld	In.	Butt Weld
⅛	43½	1	51½-52½
¼	43½	1¼	52-53
⅜	40	1½	52½-53½
½	46-47	2	53-54
¾	49-50	2½ & 3	53½-54½

In.	Lap Weld	Elec. Weld	Seamless
2	43½	43	42½
2½ & 3	46½	46	45½
3½-6	48½	48	47½
8	50½	50	49½
10	50	49½	49
12	49	48½	48

Standard Wrought Iron Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh.

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Lap Weld Blk.	Lap Weld Gal.
⅜	+46½	+74½	1¼	+12	+34½
½	+11	+35	1½	+ 6	+27½
¾	+ 1½	+25	2	— 1½	+20
1 and 1¼	— 4	+16½	2½-3½	— 4	+16
1½	— 9½	+13	4	— 8	+10½
2	—10	+12½	4½-8	— 6	+12
			9-12	+ 3	+21½

Boiler Tubes: Net base c.l. prices, dollars per 100', fob Pittsburgh; minimum wall thickness, cut lengths 4 to 24", inclusive.

Prices effective as of May 1, 1948.

O.D. In.	B.W. Ga.	Seamless Hot Rolled	Seamless Cold Drawn	Elec. Weld Hot Rolled	Elec. Weld Cold Drawn
1	13	.....	12.21-12.46	11.51	11.51
1¼	13	.....	14.46-14.76	11.48	13.64
1½	13	13.72-14.00	16.14-16.47	12.69	15.22
1¾	13	15.60-15.92	18.37-18.74	14.43	17.31
2	13	17.48-17.84	20.57-20.99	16.17	19.39
2¼	13	19.48-19.88	22.93-23.40	18.02	21.62
2½	12	21.46-21.90	25.25-25.77	19.86	23.80
2½	12	23.51-23.99	27.65-28.21	21.75	26.06
2¾	12	24.91-25.42	29.30-29.90	23.05	27.63
3	12	26.15-26.68	30.77-31.40	24.18	29.00
3¼	11	30.44-31.06	35.82-36.55	28.16	33.77
3½	11	32.68-33.35	38.47-39.26	30.23	36.27
4	10	40.57-41.40	47.73-48.70	37.53	44.99
4½	9	53.77-54.87	63.29-64.58	....	....
5	9	62.25-63.52	73.25-74.74	....	....
6	7	95.56-97.51	112.44-114.73	....	....

Pipe Cast Iron: Class B, 6-in. and over $79.50 per net ton, Birmingham; $84.50, Burlington, N. J.; $91.12, del. Chicago; 4-in. pipe, $5 higher; class A pipe, $5 a ton over Class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 19c per cwt in carlots, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step, plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	45 off
⅝ and ¾ x 6-in. and shorter.....	46 off
⅞-in. and larger x 6-in. and shorter.	43 off
All diameters longer than 6-in.....	41 off
Tire bolts	35 off
Step bolts	43 off
Plow bolts	54 off
Lag bolts, 6 in. and shorter.....	46 off
Lag bolts, longer than 6 in.....	44 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller.....	46 off	.....
½-in. and smaller.....	.....	44 off
½-in.-1-in.	44 off	.....
⅞-in.-1-in.	.....	43 off
1⅛-in.-1½-in.	42 off	41 off
1⅝-in. and larger.....	.....	35 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright).....	53 off
Upset (1035 heat treated) ⅝ and smaller x 6 and shorter.....	48 off
¾, ⅞, & 1 x 6 and shorter.....	44 off

Square Head Set Screws

Upset 1-in. and smaller.....	57 off
Headless, ¼-in. and larger	40 off
No. 10 and smaller	52 off

Rivets

Fob Pitts., Cleve., Chicago, Birmingham
Structural ½-in. and larger..... 5.65c
Fob Lebanon, Pa.
Structural ½-in. and larger..... 5.65c*
⅞-in. and larger ..... 55 off*

* Plus 19c per cwt in cl; 26c in lcl.

Washers, Wrought

Fob Pitts., Chicago, Philadelphia, to jobbers and large nut and bolt mfrs.....$1-$2 off

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 17.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base Per lb
18.00	4	1	...	82.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	67.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, cents per lb, Pittsburgh, Chicago, Cleveland, Bethlehem, Canton, Massillon, Middletown, Watervliet, Dunkirk, Syracuse, Reading, Ft. Wayne, Titusville, Brackenridge, Jersey City, W. Leechburg, Baltimore and Washington, Pa.

Grade	Bars, Wire, Shapes	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301....	26.00c	29.50c	37.00c	22.00c	28.00c
302....	26.00	29.50	37.00	23.50	30.50
303....	28.50	31.50	39.00	29.50	36.00
304....	27.50	31.50	39.00	25.50	32.50
308....	31.50	37.00	44.50	31.00	38.00
309....	39.00	43.50*	51.00*	40.50	51.00
310....	53.50	56.50†	57.50‡	53.00	61.00
316....	43.50	48.00	52.00	43.50	52.00
321....	31.50	37.00	44.50	32.00	41.50
347....	36.00	41.50	49.00	36.00	45.50
431....	21.00	24.00	31.50	19.00	24.50
440A ..	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
410....	20.50	23.50	29.00	18.50	24.00
416....	21.00	24.00	29.50	20.00	25.50
420....	26.00	31.00	36.50	26.00	39.50
430....	21.00	24.00	31.50	19.00	24.50
430F ..	21.50	24.50	32.00	20.50	27.00
442, 443	24.50	28.00	35.50	26.00	35.00
446....	30.00	33.00	39.50	38.00	56.50
§501...	9.00	13.00	17.50	13.00	18.50
§502...	10.00	14.50	18.50	14.50	19.50
****STAINLESS CLAD STEEL (20%)**					
304....	....	24.00	22.00	....	....
410....	....	22.00	20.00	....	....
430....	....	22.50	20.50	....	....
446....	....	29.00	27.00	....	....

One producer quotes: * 6.50c higher, † 3.50c higher, ‡ 10.00c higher. § Low chromium. ** Fob Pittsburgh, Washington and Coatesville, Pa.; plate prices include annealing, pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., base	$40.00	$40.50	$41.00	$41.50
Newark, N. J., del.	42.39	42.89	43.39	43.89
Brooklyn, N. Y., del.	....	44.40	44.90	....
Philadelphia, del.	42.17	42.67	43.17	43.67
Birmingham, base	38.88	39.38	....	....
Cincinnati, del.	....	45.09	....	....
Buffalo, base	40.00†	40.00†	40.50†	41.00
Boston, del.	48.42	48.42	48.92	....
Rochester, del.	42.22	42.22	42.72	43.22
Syracuse, del.	43.025	43.025	43.525	44.025
Chicago, base	38.50	39.00	39.50	40.00
Milwaukee, del.	40.22	40.72	41.22	41.72
Muskegon, Mich., del.	....	43.98	44.48	....
Cleveland, fob furnace	38.50†	39.00†	39.50†	40.00
Akron, del.	40.67	41.17	41.67	42.17
Duluth, base	39.00	39.50	40.00	40.50
Erie, Pa., base	38.50	39.00	39.50	40.00
Everett, Mass., base	....	48.75	49.25	....
Granite City, Ill., base	45.25	45.75	46.25	....
St. Louis, del.	46.00	46.50	47.00	....
‡Neville Island, Pa., base	42.00	42.50	42.50	43.00
Pittsburgh, del., N.&S. Sides	43.08	43.58	43.58	44.08
Provo, Utah, base	39.00	39.50	....	....
Seattle, Tacoma, Wash., del.	....	46.63	....	....
Portland, Oreg., del.	....	46.63	....	....
Los Angeles, San Francisco	46.13	46.63	....	....
Sharpsville, Pa., base	39.00	39.50	39.50	40.00
Steelton, Pa., base	40.00	40.50	41.00	41.50
Struthers, O., base	42.50	....	....	....
Swedeland, Pa., base	45.00	45.50	46.00	46.50
Toledo, O., base	38.50	39.00	39.50	40.00
Cincinnati, del.	43.05	43.55	....	....
Youngstown, O., base	39.00	39.50	39.50	40.00
Mansfield, O.	42.87	43.37	43.37	43.87

† Republic Steel Corp. quotes $2.875 higher for No. 2 foundry and malleable and $2.375 higher for basic at Buffalo, and $1.25 higher at Cleveland, effective on shipments during week ended July 4.

‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaco; $1.73 Verona; $1.94 Brackenridge; $1.08 to Ambridge and Aliquippa.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base).$53.50
6.51-7.00..$54.75 9.01- 9.50. 61.00
7.01-7.50.. 56.00 9.51-10.00. 62.25
7.51-8.00.. 57.25 10.01-10.50. 63.50
8.01-8.50.. 58.50 10.51-11.00. 64.75
8.51-9.00.. 59.75 11.01-11.50. 66.00

Fob Jackson, O., per gross ton. Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $78.75, Niagara Falls; $78 open-hearth and $79 foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.05% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.....$58 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $42.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $46.00. Philadelphia, $48.81, delivered. Intermediate phosphorus, Central furnace, Cleveland, $42.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace	$12.00-$14.00
Connellsville, foundry	14.50- 16.50
New River, foundry	15.50
Wise county, foundry	14.25
Wise county, furnace	13.50

Oven Foundry Coke

Kearney, N. J., ovens	$20.50
Chicago, outside del.	19.50
Chicago, del.	20.75
Terre Haute, ovens	20.25
Milwaukee, ovens	20.25
New England, del.	21.75
Birmingham, del.	16.71
Indianapolis, ovens	20.10
Cincinnati, del.	20.50
Ironton, O., ovens	18.25
Erie, Pa., del.	21.55
Painesville, O., ovens	20.00
Cleveland, del.	21.55
Buffalo, del.	21.75-22.20
Detroit, del.	20.50-20.75
Philadelphia, ovens	19.55
Swedeland, Pa., ovens	19.50
Portsmouth, O., ovens	18.25

Coal Chemicals

Spot, cents per gallon

Pure and 90% benzol	21.00†
Toluol, two degrees	28.00
Industrial xylol	28.00
Solvent naphtha	28.00

Per pound fob works

Phenol (car lots, returnable drums)	13.00
Do., less than carlots	13.75
Do., tank cars	12.00

Eastern plants, per pound

Naphthalene flakes, balls, bbl. to jobbers, "household use"	12.00

Per ton, bulk, fob plants

Sulphate of ammonia	$40.00

† Freight allowed up to 2 cents.

Refractories

(Base prices per 1000, fob plant)

Fire Clay Brick

Super Duty: St. Louis, $92.

High-Heat Duty: Salina, Pa., Woodbridge, N. J., $78; St. Louis, Mo., West Decatur, Orviston, or Beach Creek, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Troup, Tex., Stevens Pottery, Ga., Oakhill, O., $73.

Intermediate-Heat Duty: St. Louis, Mo., West Decatur, Orviston, or Beach Creek, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Troup, Tex., Stevens Pottery, Ga., $67; Woodbridge, N. J., $70.

Low-Heat Duty: Oak Hill, O., $59.

Ladle Brick

Dry Press: $50.

Wire Cut: $48.

Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., $83; Beach Creek, Pa., $73.

Silica Brick

Mt. Union, Claysburg, Sproul, Pa., $73; Hays, Pa., $78; Joliet or Rockdale, Ill., $82; Lehi, Utah, Los Angeles, $88.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., $69.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., $70.

Basic Brick

(Base prices per net ton); f.o.b. works, Baltimore)

Chrome brick or chemical-bonded chrome brick, $64; magnesite brick, $86; chemical-bonded magnesite, $75.

Magnesite

(Base prices per net ton, fob works, Chewelah, Wash.)

Domestic dead-burned, ¾" grains: Bulk, $31; single paper bags, $35.50.

Dolomite

(Base prices per net ton)

Domestic, dead-burned, bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibonsburg, Woodville, O., $11.85; Thornton, McCook, Ill., $11.95; Dolly Siding, Bonne Terre, Mo., $12.05.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural) Lower Lake Ports

(Any increase or decrease in R. R. freight rates, dock handling charges and taxes thereon effective after Apr. 1, 1948, are for buyer's account.)

Old range bessemer	$6.60
Old range nonbessemer	6.45
Mesabi bessemer	6.35
Mesabi nonbessemer	6.20
High phosphorus	6.20

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% contract	15.25

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos.	Nom.
Swedish basic, 60 to 68%	13.50-14.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50-6.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26-$28

Manganese Ore

48-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 67.60c-72.60c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$25.50-$26.00
45% no ratio	26.50
48% no ratio	29.00-30.00
50% no ratio	29.50-30.50
Brazilian—nominal	
44% to 2.5:1 lump	$33.65
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo., cont., Mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $35; less than 60% $32.

HIGH STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Cleveland	Bethlehem	Canton Massillon
Sheet, Hot-Rolled	4.20	4.20-4.30	4.20-4.30	4.20-4.30	4.30	4.30	4.20	...	...
Cold-Rolled	5.20	5.20-5.30	5.20-5.30	5.20-5.30	...	5.30	5.20	...	...
Galvanized	5.90	.....	.....	.....	...	6.00	...	...	...
Strip, Hot-Rolled	4.20	4.30	4.20-4.30	4.20-4.30	...	...	4.20	...	...
Cold-Rolled	5.20	5.30†	5.30†	5.30	...	...	5.20	...	...
Shapes, Structural	4.20	4.20-4.30	4.20	4.30	...	...	...	4.30	...
Plates	4.45	4.45-4.55	4.45-4.55	.....	4.55	...	...	...	...
Bars, Small Shapes	4.35	4.35-4.45	4.35-4.45	4.35-4.45	...	4.45	...	...	4.45

† Nax High Tensile, produced by Great Lakes Steel Corp., quoted 10 cents higher.

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS			STRIP		BARS				PLATES	
	H-R 10 Ga.	C-R 17 Ga.	Gal. *10 Ga.	†H-R	†C-R	H-R Rds. ⅝" to 3"	C-F Rds. ½" & up	H-R Alloy **4140	Structural Shapes§§	Carbon ⅜"-¾"	Floor ⅝" & Thicker
Boston (city) ..	5.08	5.84[4]	6.28[4]	5.64	6.90	5.09	5.96	7.70	4.94	5.23	6.89
Boston (c'try)..	4.98	5.64[4]	6.08[4]	5.44	...	4.89	...	...	4.74	5.03	6.69
New York (city)	4.94	5.80	6.13	5.58	...	5.05	5.78	7.23	4.77	5.09	6.58
New York (c'try)	4.79	5.65	5.98	5.43	...	4.90	...	...	4.62	4.94	6.43
Phila. (city)...	4.87	5.81	5.92	5.36*†	...	4.91	5.73	7.30	4.59	4.87	6.36
Phila. (c'try.)..	4.72	5.66	5.77	5.21*†	...	4.76	...	...	4.44	4.72	6.21
Wash. (city) ..	4.81	...	...	5.08	...	5.14	5.79	...	4.98	5.03	6.68
Wash. (c'try.) .	4.71	...	...	4.98	...	5.04	...	...	4.88	4.93	6.58
Balt. (city) ...	4.27†	5.59	5.62	4.79	...	4.84	5.66	...	4.69	4.72	6.09
Balt. (c'try.) .	4.12†	5.44	5.40	4.64	...	4.69	...	...	4.54	4.57	5.94
Norfolk, Va. ..	4.90	...	...	...	...	5.20	6.00	...	5.15	5.15	6.90
Memphis (city)	4.91[20]§	5.98*†	...	5.11[20]	...	5.01[20]	5.88	...	5.01[20]	5.21[20]	6.83[20]
Memphis (c'try)	4.81[20]§	5.88*†	...	5.01[20]	...	4.91[20]	5.78	...	4.91[20]	5.11[20]	6.73[20]
Buffalo (city) .	4.25	5.20[8]	6.05	5.25	5.97	4.40	5.10	6.85	4.40	5.00	6.25
Buffalo (c'try.)	4.10	5.05[8]	5.50	4.70	5.82	4.25	4.95	6.85	4.25	4.45	5.75
Pitts. (city) ..	4.20-4.25§	5.05-5.10*†	5.60-5.65	4.30-4.35	5.35	4.35-4.40	5.05-5.10	6.70	4.35-4.40	4.55	5.90
Pitts. (c'try) ..	4.05-4.10§	4.85-4.95*†	5.40-5.50	4.15-4.20	5.20	4.20-4.25	4.85-4.95	6.70	4.20-4.25	4.40	5.75
Cleve. (city) ..	4.45	5.10[8]	5.84	4.52	5.25	4.40	5.00-5.10	7.14	4.67	4.60	5.90
Cleve. (c'try.) .	4.30-4.90	4.95-5.75[8]	...	...	5.10	4.25	4.85-4.95	...	...	4.45	5.75
Detroit	4.66	5.31	6.10	4.75	5.97	4.61	5.49	7.47	4.80	4.95	6.25
Cincinnati	4.51-4.66	5.22	5.77	4.80	6.00	4.76	5.59	...	4.80	4.96	6.21
Indianapolis ...	4.52	5.01[8]	5.96	4.62	5.87	4.67	5.52	8.85	4.67	4.87	6.17
Chicago (city) .	4.40	5.10[8]	5.55-5.65	4.30	5.35	4.35	5.00	6.70[9]	4.35	4.55	5.80
Chicago (c'try.)	4.25	4.95[8]	5.40-5.50	4.15	5.20	4.20	4.85	6.70[9]	4.20	4.40	5.65
Milwaukee	4.62	5.32[8]	5.77-5.87	4.52-5.02	5.57	4.57	5.334	7.184[9]	4.57	4.77	6.02
St. Paul, Minn..	4.66[8]	5.56[8]†	6.01[8]	4.76	6.29[13]	4.81[8]	5.94[11]	7.84[11]	4.81[8]	5.01[8]	6.28[8]
St. Louis	4.79	5.49[8]	6.27	5.24	5.97	4.74	5.62[12]	8.97	4.74	4.94	6.19
Birming. (city).	4.45[20]§	...	5.65	4.45[20]	...	4.40[20]	6.09[22]	...	4.40	4.65	6.99
Birming. (c'try.)	4.30[20]§	...	5.50	4.30[20]	...	4.25[20]	...	...	4.25	4.50	...
Houston, Tex. .	5.75	...	7.36	6.00	...	5.70	7.00	9.25[9]	5.70	5.90	7.20
Omaha, Nebr...	5.31	...	6.76	5.41	...	5.46	6.96	...	5.41	5.66	5.65
Los Angeles ...	5.70§	7.25[8]	7.30	6.00	8.60	5.45	7.25[1]	9.40[2]‡‡	5.15-5.30	5.35	7.40
Seattle-Tacoma.	5.45[17]§	7.25[8]‡	7.10	6.15[17]	...	5.65[17]	7.35[1]	8.70[12]	5.30[17]	5.60[17]	7.65[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 39,999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—400 to 14,999 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [13]—2000 lb and over; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § 18 gage and heavier; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ annealed; §§ except wide flange beams, which are 0.05c lower; 12G. & heavier and includes machine straightening.

PRICES OF LEADING FERROALLOYS PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $52, Palmerton, Pa., $51, Pittsburgh; (16% to 19% Mn.) $1 per ton lower. **Standard Ferromanganese:** (Mn 78-82%, C 7% approx.). Carload, lump, bulk $145 per gross ton of alloy, carload packed $157, ton lot $172, less ton $189, fob New Orleans, Mobile, Philadelphia, Baltimore, New York. Carload, lump, bulk, $150 fob Rockwood, Tenn.; $150.50 fob Aetna, Pa., or $151.15 within Pittsburgh switching limits. Add or subtract $1.80 for each 1%, or fraction thereof, of contained manganese over 82% or under 78%. West Coast Prices: Carload (80,000 lb or more), lump, bulk, same price and basing points as above. All other prices for shipment from Pacific Coast warehouses, add $26.21 to above prices. Delivery is fob Portland, Los Angeles, South San Francisco, or Seattle warehouses, with railroad freight allowed on shipments of 25 gross tons or more.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Eastern Zone, carload, lump, bulk, max. 0.10% C, 22.5c per lb of contained Mn, carload packed 23.25c, ton lot 24.35c, less ton 25.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Eastern Zone, carload, lump, bulk 16.5c per lb of contained Mn, carload packed 17.25c, ton lot 18.35c, less ton 19.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Eastern Zone, carload, 2" x D, bulk 32c per lb of metal, carload packed 32.5c, ton lot 34c, less ton 36c; Central, add 1c for c.l. and 1.45c for l.c.l.; Western, add 1.45c for c.l. and 2.4c for l.c.l. Freight allowed. Spot, add 2c.

Silicomanganese: (Mn 65-70%). Eastern Zone, contract, lump, bulk, 1.50% C grade, 17-20% Si, 7.8c per lb of alloy, carload packed, 8.55c, ton lot 9.45c, less ton 10.45; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. For 2.0% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Eastern Zone, contract, c.l., lump, bulk 18.6c per lb of contained Cr, c.l., packed 19.5c, ton lot 20.65c, less ton 22.05c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Eastern Zone, contract, c.l., 8MxD, bulk 20.1c per lb of cotnained Cr, c.l., packed 21.0c, ton lot 22.35c, less ton 24.1c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Eastern Zone, contract, carload, lump, bulk, max. 0.03% C 28.5c per lb of contained Cr, 0.04% C 27.5c, 0.05% C 27.0c, 0.06% C 26.5c, 0.10% C 26.0c, 0.15% C 25.5c, 0.20% C 25.25c, 0.50% C 25.0c, 1% C 24.5c, 2% C 24.25c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed, Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, add C 1.25% max.). Eastern Zone, contract, carload, lump, bulk 25c per lb of contained chromium, carload, packed 26.1c, ton lot 27.3c, less ton 29.1c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 2c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 2c for each 0.25% of N above 0.75%.

Chromium Metal: (Mn. 97% Cr and 1% Fe). Eastern Zone, contract, carload, 1" x D; packed, max. 0.50% C grade, 93c per lb of contained chromium, ton lot 94.5c, less ton 97c; Central, add 1.5c for c.l. and 2.5c for l.c.l.; Western, add 2.75c for c.l. and 4.5c for l.c.l. Freight allowed. Spot, add 5c.

SILICON ALLOYS

20-30% Ferrosilicon: Contract, carload, lump, bulk, 16.50c per lb. of contained Si, fob Niagara Falls, N. Y.

50% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 9.3c per lb of contained Si, carload packed 10.9c, ton lot 12.35c, less ton 14.0c; Central, add 0.5c for c.l. and 1.25c for l.c.l.; Western, add 0.7c for c.l. and 1.8c for l.c.l. Freight allowed. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (All 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 11.8c per lb of contained Si carload packed 13.1c, ton lot 14.25c, less ton 15.5c; Central, add 0.3c for c.l. add 0.75c for l.c.l.; Western, add 1.05c for c.l. and 5c for l.c.l. Freight allowed. Spot, add 0.3c.

85% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 13.3c per lb of contained Si, carload packed 14.55c, ton lot 15.55c, less ton 16.7c; Central, add 0.3c for c.l. and 0.7c for l.c.l.; Western, add 1.05c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0,25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk, 15c per lb of contained Si carload packed 16.2c, ton lot 17.15c, less ton 18.2c; Central, add 0.3c for c.l. and 0.65c for l.c.l.; Western, add 1c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Over 97% Si and 1% max. Fe.) Eastern Zone, c.l., lump, bulk, regular 17.3c per lb of Si, c.l. packed 18.5c, ton lot 19.4c, less ton 20.4c; Central, add 0.6c for c.l. and 2.25c for l.c.l.; Western, add 1.2c for c.l. and 4c for l.c.l. Add 1c for max. 0.20% calcium grade. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing over 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb cl 6.90c; ton lots packed, 7.40c; 200 to 1999 lb, 8.15c; smaller lots 8.65c. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3½ lb each and containing exactly 2 lb of Cr). Eastern Zone, contract, carload, bulk, 12.5c per lb or briquet, carload packed 13.2c, ton lot 14.0c, less ton 14.9c; Central, add 0.25c for

(Please turn to Page 158)

Nonferrous Metal Prices Advance

Prices raised 1 cent by leading primary aluminum producer, 1½ cents by secondary ingot producers, 1 to 1½ cents by brass mills

New York — Forced by the third postwar round of wage increases and further advances in other operating costs, the leading producer of primary aluminum and two large producers of copper and brass products advanced prices last week. Secondary aluminum also moved to higher levels, due to continued active demand for limited supplies of high-priced scrap.

Aluminum — Effective June 28, Aluminum Co. of America increased its base prices 1 cent a pound to the basis of 16.00c a pound for 99 per cent aluminum ingot and 15.00c a pound for aluminum pig. This is the first time in 11 years that an upturn in the basic price has been necessary. Over that 11-year period, the basic price of primary aluminum decreased 30 per cent in the face of sharply increased prices for nearly all other materials, R. V. Davies, vice president and general sales manager, said.

Appropriate adjustments also were made on the company's other products. On the new basis, flat sheet (maximum length, 60 inches) coiled sheet and coiled sheet circle (maximum diameter, 24 inches) aluminum are quoted, respectively, as follows, in cents per pound: 0.060-0.048 inch thickness and 12 to 48 inches in width or diameter, 27.7, 25.4 and 29.1; 0.018 to 0.017 inch and 12 to 36 inches, 30.1, 27.3 and 31.6; 0.011 inch and 12 to 24 inches, 33.6, 30.3, and 35.7; 0.006 inch and 12 to 18 inches, 37.1, 33.6 and 40.1. Screw machine stock prices, 17S-T alloy, 5000 pounds and over, are as follows in cents per pound for rounds and hexagonal, respectively: 0.375 inch diameter or distance across flats, 35.5 and 43; 0.500 inch, 35.5 and 43; 0.625 inch, 35.5 and 40.5; 1.063 inches, 34.5 and 36.5; 1.625 inches, 32.5 and 35.5.

"Alcoa is most reluctant to make these upward price adjustments," Mr. Davies said. "Alcoa's current wage rates represent an increase of more than 85 per cent over the rates in effect during 1939. With material costs continuing to climb, plus three recent increases in freight rates, the added burden to the last wage rise made the price action necessary." The company has just made a new wage agreement with the United Steelworkers (CIO), calling for increases of from 10 cents to 16 cents per hour for all hourly-paid employees.

No price action was taken by other primary aluminum producers last week.

Output of primary aluminum in April totaled 53,277 net tons, an increase of 3 per cent over the 51,874 tons produced in March, and the highest monthly production since August, 1944, according to the Bureau of Mines. After a steady decline of eight months' duration, stocks of pig aluminum at reduction plants increased slightly in April, as shipments and use of pig were lower than output.

Secondary Aluminum — As a result of further tightening of supplies and increases in scrap prices, smelters have raised prices on secondary aluminum ingot an average of 1½ cents per pound on all grades.

Trading developments indicate net advances of from about 1-1/2 to 2-1/2 cents a pound on foundry grades and 1 cent to 1-1/2 cents on steel deoxidizing grades. The 1-cent advance in primary metal apparently had only a slight effect on developments in secondary markets, although it did stimulate buying of remelt ingot.

Federated Metals Division, American Smelting & Refining Co., withdrew quotations on secondary aluminum ingots, stating the scrap market no longer exists in the sense that supplies are available at any assured or reasonable level. Each individual order will be quoted on the basis of ability to cover scrap needs at that time.

Copper — Copper and red metal scrap is being purchased by the federal government for strategic stockpiles vital to national defense. In addition to this buying, activity in the market increased last week on purchases in copper and brass components of industrial items. Some purchasing executives fear a continuing and greater shortage of copper and brass products, extending through the balance of this year

Copper and Brass Products—American Brass Co. and Chase Brass & Copper Co. advanced brass mill product prices 1 to 1.50 cents a pound last week. The higher prices resulted from increased costs of labor, supplies and other costs. Base prices were lifted 1 to 1.25 cents a pound on brass sheets, wire and rods; 1.50 cents a pound on seamless brass tubes; 1 cent a pound on 18 per cent nickel sheets; and 1.45 cents a pound on phosphor bronze, grade A, sheets. Revere Copper & Brass Inc., one of the three largest producers, did not advance prices.

Lead—Stocks of refined lead increased 2965 tons during May to 22,418 tons from 19,453 tons at the end of April and only 14,837 tons at the end of March, according to the American Bureau of Metal Statitstics. Production was slightly higher at 50,626 tons compared with 49,652 tons in April while shipments totaled 47,652 tons compared with 45,031 tons in the preceding month.

The primary market held unchanged last week at 17.30c to 17.35c, St. Louis, with demand still exceeding offerings.

Zinc—According to trade reports, Office of Materials Distribution, Department of Commerce, has discontinued allocation of zinc to consumers and will hold all remaining supplies in the hands of Office of Metals Reserve for the national stockpile. Due to continued active demand, coupled with restricted supplies, the undertone of the market remained strong last week on the basis of 12.00c, East St. Louis, for prime western.

Tin—Reconstruction Finance Corp. purchased practically all of the 20,400 tons of pig tin which were allocated to the United States by the Combined Tin Committee for the first half of 1948. This consisted chiefly of grade A tin, principally Straits, in addition to some tonnages of Chinese and Siamese metal. The market remained firm last week at $1.03 a pound.

Metal Price Averages For June

(Cents per pound)

Electrolytic Copper, del. Conn.	21.500
Lead, St. Louis	17.325
Prime Western Zinc, E. St. Louis	12.000
Straits Tin, New York	103.000
Primary Aluminum Ingots, del.	15.058
Antimony, f.o.b. Laredo, Tex.	35.000
Nickel, f.o.b. refinery	33.750
Silver, New York	74.625

Copper Consumption Drops

New York—Consumption of copper declined 4601 tons during May compared with the April figure to a total of 112,730 tons, but showed a decline of only 249 tons from the May, 1947, figure, according to the Copper Institute. The decline in consumption was in line with the smaller tonnage of copper received by fabricators from producers, amounting to only 113,389 tons against 116,475 tons in April.

Fabricators' stocks of refined copper increased 1209 tons to 408,951 tons at the end of May, leaving visible supplies of 109,755 tons after allowing 299,196 tons for working stocks. Undelivered purchases of copper amounted to 94,361 tons, making total stocks and purchases 204,116 tons compared with 209,412 tons at the end of April. Against this total, fabricators had unfilled orders for 305,849 tons, making a deficit in stocks of 101,733 tons compared with 84,895 tons at the end of April.

Brass Ingot Shipments Dip

New York—Shipments of brass and bronze ingots declined in May to 23,716 tons from 25,177 tons in April and compared with 19,525 tons in May, 1947, according to the Ingot Brass & Bronze Industry. Total shipments for the first five months of 1948 amounted to 122,660 tons compared with 124,106 tons in the like 1947 period. Average monthly shipments of 24,532 tons so far this year have been exceeded only during the 1942-1946 period when they averaged 34,525 tons.

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 21.50c, Conn. Valley; Lake, 21.62½c Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 19.50-20.00c; 88-10-2 (No. 215) 29.00c; 80-10-10 (No. 305) 25.25c; No. 1 yellow (No. 405) 15.25-16.00c. Prices include 25 cents per 100 lb freight allowance.

Zinc: Prime western 12.00c, brass special 12.25c, intermediate 12.50c, East St. Louis; high grade 13.00c, delivered.

Lead: Common 17.30-17.35c; chemical and corroding 17.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 16.00c, pigs 15.00c; metallurgical 94% min. 14.50c. Base prices for 10,000 lb and over, fob shipping point, freight allowed.

Secondary Aluminum: Piston alloy (No. 122 type) 22.75c; No. 12 foundry alloy (No. 2 grade) 22.50-23.75c; steel deoxidizing grades, notch bars, granulated or short: Grade 1, 23.75c; grade 2, 23.00c; grade 3, 22.50c; grade 4, 22.00c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, fob Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1.024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 35.00; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 35.50c, fob Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 33.75c; 25-lb pigs, 35.25c; shot, 36.25c; "F" nickel shot or ingots, for addition to cast iron, 34.25c. Prices include import duty.

Mercury: Open market, spot, New York $76-$78 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $20.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $1.75, del.; Special or patented shapes, $1.80.

Cobalt: 97-98%, $1.65 per lb for 550 lb (keg); $1.67 per lb for 100 lb (case); $1.72 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 74.62½c per ounce.

Platinum: $75-$78 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, fob mill.)

Sheet: Copper 33.68-35.18c; yellow brass 30.16-31.41c; commercial bronze, 95%, 33.80-35.05c; 90% 33.27-34.52c; red brass, 85% 32.23-33.48c; 80% 31.70-32.95c; best quality 31.09-32.34c; nickel silver, 18%, 42.42-43.42c; phosphor bronze, grade A, 5%, 52.70-54.15c.

Rods: Copper, hot rolled 30.03-31.53c; cold drawn 31.03-32.53c; yellow brass, free cutting, 24.69-25.94c; commercial bronze, 95% 33.49-34.74c, 90% 32.96-34.21c; red brass, 85% 31.92-33.17c, 80% 31.39-32.64c.

Seamless Tubing: Copper 33.72-35.22c; yellow brass 32.92-34.42c; commercial bronze 90% 35.68-37.18c; red brass 85% 34.89-36.39c, 80% 34.36-35.86c.

Wire: Yellow brass 30.45-31.70c; commercial bronze, 95% 34.09-35.34c; 90% 33.56-34.81c; red brass, 85% 32.52-33.77c, 80% 31.99-33.24c; best quality brass 31.38-32.63c.

Copper Wire: Bare, soft, fob eastern mills, c.l. 26.80-28.37½c, l.c.l. 27.30-28.87½c; weatherproof, fob eastern mills, c.l. 27.35-29.00c, l.c.l. 27.85-29.50c; magnet, delivered, c.l. 29.75-31.50c, 15,000 lb or more 30.00-31.75c, l.c.l. 30.50-32.25c.

ALUMINUM

(Revised price schedule pending; effective June 28)

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	24.0	...	...
0.135-0.126	12-48	24.5	...	...
0.125-0.096	12-48	24.5	23.1	26.3
0.095-0.077	12-48	25.0	23.2	26.5
0.076-0.061	12-48	25.5	23.4	26.7
0.060-0.048	12-48	25.7	23.6	27.0
0.047-0.038	12-48	26.1	23.8	27.3
0.037-0.030	12-48	26.4	24.1	27.7
0.029-0.024	12-48	26.8	24.4	28.1
0.023-0.019	12-36	27.4	24.8	28.6
0.018-0.017	12-36	27.9	25.3	29.3
0.016-0.015	12-36	28.6	25.9	30.1
0.014	12-24	29.4	26.6	31.1
0.013-0.012	12.24	30.2	27.3	32.0
0.011	12-24	31.1	28.1	33.1
0.010-0.0095	12-24	32.1	29.0	34.3
0.009-0.0085	12-20	33.2	30.0	35.7
0.008-0.0075	12-20	34.4	31.1	37.1
0.007	12-18	35.7	32.3	38.8
0.006	12-18	37.0	33.5	42.6

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T	17S-T	—Hexagonal— R317-T	17S-T
0.125	45.0	44.0	...	...
0.156-0.203	38.5	37.5	...	...
0.219-0.313	35.5	34.5	...	...
0.344	34.0	33.0	...	...
0.375	33.0	32.0	42.5	40.0
0.406	33.0	32.0	...	...
0.438	33.0	32.0	42.5	40.0
0.469	33.0	32.0	...	...
0.500	33.0	32.0	42.5	40.0
0.531	33.0	32.0	...	...
0.563	33.0	32.0	40.5	38.0
0.594	33.0	32.0	...	...
0.625	33.0	32.0	40.5	38.0
0.656	33.0	32.0	...	...
0.688	33.0	32.0	40.5	38.0
0.750-1.000	32.0	31.0	37.0	35.5
1.063	32.0	31.0	35.5	34.0
1.125-1.500	31.0	30.0	35.5	34.0
1.563	31.0	30.0	...	...
1.625	30.0	29.0	34.5	33.0
1.688-2.000	30.0	29.0	...	...
2.125-2.500	29.5	28.5	...	...
2.625-3.375	28.5	27.5	...	...

LEAD

(Prices to jobbers, fob Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $20.85 per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft; $1.25, less than 10 sq ft; $1, circles and segments. Pipe: Full coils, $20.10 per cwt; cut coils, $20.35. Traps and Bends: List price plus 52%.

ZINC

Sheets, 16.50c-17.00c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 15.25c-16.00c, fob mill, 36,000 lb and over. Plates, not over 12-in., 14.25c; over 12-in., 15.25c.

NICKEL

(Base prices, fob mill.)

Sheets, cold-rolled, 54.00c. Strip, cold-rolled 60.00c. Rods, hot-rolled 50.00c, cold-finished 55.00c. Angles, hot-rolled, 50.00c. Plates, 52.00c. Seamless tubes, 83.00c.

MONEL

(Base prices, fob mill.)

Sheets, cold-rolled 43.00c; No. 35, 41.00c. Strip, cold-rolled, 44.00c. Rods, hot-rolled 39.00c; cold-finished 44.00c. Angles, hot-rolled, 39.00c. Plates, 41.00c. Seamless tubes, 71.00c. Shot and blocks, 31.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb. 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9%, flake, fob Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 30.59c; oval, 30.09c; electrodeposited, 29.84c; cast, 29.59c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 44.00c, fob Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 16.00c; 1000 to 19,900 lb, 15.00c, fob Niagara Falls, N. Y.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.00c; over 250 lb, 24.00c, fob Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 3000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; fob Cleveland. Add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 25.00c; 275-lb, or 500-lb bbls. 23.00c, fob Cleveland.

Tin Anodes: Bar, 1000 lb and over 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb, 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c, fob Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 71.8c; 100 or 300 lb drums only, 100 to 500 lb, 63.6c; 600 to 1900 lb, 61.2c; 2000 to 9900 lb, 59.4c. Prices fob Sewaren, N. J.

Zinc Cyanide: 100-lb drums 37.25c, fob Cleveland; 37.00c, Detroit; 36.00c, fob Philadelphia.

Stannous Sulphate: Less than 2000 lb, in 100 lb kegs, 100.00c, in 400 lb bbl. 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 21.50c, Conn., for copper)

Prices in cents per pound for less than 15,000 lb fob shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.625	15.375	14.750
Commercial Bronze			
95%	18.125	17.875	17.375
90%	17.625	17.375	16.875
Red brass			
85%	17.500	17.250	16.750
80%	17.250	17.000	16.500
Best Quality (71-79%)	16.625	16.375	15.875
Muntz Metal	14.750	14.500	14.000
Nickel silver, 5%	16.500	16.250	8.250
Phos. bronze, A. B.	20.750	20.500	19.500
Naval brass	15.250	15.000	14.500
Manganese bronze	15.250	15.000	14.375

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 18.50, No. 2 copper 17.50, light copper 16.50, composition red brass 15.00-15.25, auto radiators 12.50-12.75, heavy yellow brass 10.75-11.00, brass pipe, 11.75-12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 18.50-18.75, No. 2 copper 17.50-17.75, light copper, 16.50-16.75, refinery brass (60% copper), per dry copper content 16.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 16.75-17.00, No. 2 15.75-16.00, light copper 14.75-15.00, No. 1 composition red brass 13.00-13.25, No. 1 composition turnings 12.50-12.75, mixed brass turnings 7.50-7.75, new brass clippings 13.00-13.50, No. 1 brass rod turnings 10.00-10.50, light brass 7.00, heavy yellow brass 9.25-9.50, new brass rod ends 10.50-11.00, auto radiators, unsweated 10.25-10.50, cocks and faucets 10.25-10.50, brass pipe 10.25-10.50.

Lead: Heavy 15.50-16.00, battery plates 9.75-10.25, linotype and stereotype 17.25-17.50, electrotype 15.00-15.50, mixed babbitt 14.25-14.75, solder joints, 18.75-19.25.

Zinc: Old zinc 5.75-6.00, new die cast scrap 4.75-5.25, old die cast scrap 2.75-3.25.

Tin: No. 1 pewter 65.00-67.00, block tin pipe 83.00-84.00, auto babbitt 51.00-53.00, No. 1 babbitt 51.00-54.00, siphon tops 50.00-52.00.

Aluminum: Clippings 2S 11.00-11.50, old sheets 9.00-9.50, crankcasses 9.00-9.50, borings and turnings 4.50-5.00, pistons, free of struts, 9.00-9.50.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
June Avg.	21.500	17.325	12.000	103.00	15.058	35.000	33.750	74.625
June 1-27	21.500	17.30-17.35	12.000	103.000	15.000	35.00	33.750	74.625
June 28-30	21.500	17.30-17.35	12.000	103.00	15.00-16.00	35.00	33.750	74.625
July 1	21.500	17.30-17.35	12.000	103.00	15.00-16.00	35.00	33.750	74.625

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, fob Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$40.00-40.50*
No. 2 Heavy Melt. Steel	40.00-40.50*
No. 1 Busheling	40.00-40.50*
Nos. 1, 2 & 3 Bundles	40.00-40.50*
Machine Shop Turnings	36.50-37.00
Mixed Borings, Turnings	36.50-37.00
Short Shovel Turnings	37.00-37.50
Cast Iron Borings	37.00-37.50
Bar Crops and Plate	47.50-48.00
Low Phos. Steel	47.50-48.50
Heavy Turnings	39.50-40.00

Cast Iron Grades

No. 1 Cupola	63.00-65.00
Charging Box Cast	53.00-54.00
Heavy Breakable Cast	56.00-58.00
Unstripped Motor Blocks	52.00-53.00
Malleable	69.00-70.00
Brake Shoe	55.50-56.00
Clean Auto Cast	58.00-59.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.00-41.50
R.R. Malleable	75.00-80.00
Axles	51.50-52.00
Rails, Rerolling	56.00-58.00
Rails, Random Lengths	54.00-56.00
Rails, 3 ft and under	60.00-60.50
Rails, 18 in. and under	62.50-63.50
Railroad Specialties	55.00-56.00
Uncut Tires	52.00-52.50
Angles, Splice Bars	53.00-54.00

* Plus applicable freight springboard.

CLEVELAND

No. 1 Heavy Melt. Steel	$39.50-40.00*
No. 2 Heavy Melt. Steel	39.50-40.00*
No. 1 Busheling	39.50-40.00*
Nos. 1 & 2 Bundles	39.50-40.00*
Machine Shop Turnings	34.50-35.00
Mixed Borings, Turnings	34.00-36.00
Short Shovel Turnings	35.50-36.00
Cast Iron Borings	35.50-36.00
Bar Crops and Plate	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Heavy Turnings	39.50-40.50
Alloy Free Turnings	37.50-38.50
Cut Structurals	46.00-49.00

Cast Iron Grades

No. 1 Cupola	67.00-69.00
Charging Box Cast	58.00-60.00
Stove Plate	58.00-60.00
Heavy Breakable Cast	54.00-56.00
Unstripped Motor Blocks	58.00-60.00
Malleable	73.00-75.00
Brake Shoes	52.00-53.00
Clean Auto Cast	68.00-70.00
No. 1 Wheels	58.00-60.00
Burnt Cast	56.00-57.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.50*
R.R. Malleable	73.00-78.00
Rails, Rerolling	57.00-58.00
Rails, Random Lengths	56.00-57.00
Rails, 3 ft and under	61.00-63.00
Cast Steel	56.00-58.00
Railroad Specialties	53.00-55.00
Uncut Tires	51.00-53.00
Angles, Splice Bars	57.00-59.00

* Plus applicable freight springboard.

VALLEY

No. 1 Heavy Melt. Steel	$40.00-40.50*
No. 2 Heavy Melt. Steel	40.00-40.50*
No. 1 Bundles	40.00-40.50*
Machine Shop Turnings	34.50-35.50
Short Shovel Turnings	36.50-37.00
Cast Iron Borings	36.00-36.50
Low Phos.	46.00-47.50*

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.50*

* Plus applicable freight springboard.

MANSFIELD

Machine Shop Turnings	$35.00-35.50
Short Shovel Turnings	37.00-37.50

CINCINNATI

No. 1 Heavy Melt. Steel	$39.50
No. 2 Heavy Melt. Steel	39.50
No. 1 Busheling	39.50
Nos. 1 & 2 Bundles	39.50
Machine Shop Turnings	33.50
Mixed Borings, Turnings	32.50
Short Shovel Turnings	35.50
Cast Iron Borings	34.50

Cast Iron Grades

No. 1 Cupola Cast	55.00
Charging Box Cast	43.00
Heavy Breakable Cast	50.00
Stove Plate	47.00
Unstripped Motor Blocks	45.00
Brake Shoes	45.00
Clean Auto Cast	55.00
Drop Broken Cast	60.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50
R.R. Malleable	68.00
Rails, Rerolling	53.00
Rails, Random Lengths	50.00
Rails, 18 in. and under	60.00

DETROIT

(Brokers' buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$35.00-35.50
No. 1 Busheling	35.00-35.50
Nos. 1 & 2 Bundles	35.00-35.50
No. 3 Bundles	35.00-35.50
Machine Shop Turnings	29.00-29.50
Mixed Borings, Turnings	29.00-29.50
Short Shovel Turnings	30.00-30.50
Cast Iron Borings	30.00-30.50
Punchings & Plate Scrap	40.00-40.50

Cast Iron Grades

No. 1 Cupola Cast	53.00-58.00
Heavy Breakable Cast	47.00-52.00
Clean Auto Cast	53.00-58.00

BUFFALO

No. 1 Heavy Melt. Steel	$43.00-45.00
No. 2 Heavy Melt. Steel	39.75-40.25
No. 1 Busheling	39.75-40.25
No. 1 & 2 Bundles	39.75-40.25
Machine Shop Turnings	34.75-35.25
Mixed Borings, Turnings	34.75-35.25
Cast Iron Borings	35.50-36.00
Short Shovel Turnings	35.50-36.00
Low Phos.	44.75-45.25

Cast Iron Grades

No. 1 Cupola	64.00-65.00
Mixed Cupola	55.00-62.00
Heavy Breakable Cast	55.00-57.00
Malleable	70.00-75.00
Clean Auto Cast	62.00-64.00

Railroad Scrap

Rails, 3 ft. and under	60.00-61.00
Railroad Specialties	51.00-53.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$42.00-43.00
No. 2 Heavy Melt. Steel	39.00
No. 1 Busheling	39.00
Nos. 1 & 2 Bundles	39.00
No. 3 Bundles	37.00
Machine Shop Turnings	34.00-35.00
Mixed Borings, Turnings	34.00-35.00
Short Shovel Turnings	34.00-35.00
Bar Crop and Plate	47.50-48.00
Punchings & Plate Scrap	48.00-48.50
Cut Structurals	47.50-48.00
Elec. Furnace Bundles	44.00-44.50
Heavy Turnings	43.00-43.50
No. 1 Chemical Borings	42.00-43.00

Cast Iron Grades

No. 1 Cupola Cast	63.00-65.00
No. 1 Machinery Cast	67.00-68.00
Charging Box Cast	63.00-64.00
Heavy Breakable Cast	63.00-64.00
Unstripped Motor Blocks	59.50
Malleable	76.00-78.00
Clean Auto Cast	64.00-65.00
No. 1 Wheels	68.00-70.00

NEW YORK

(Brokers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.50
No. 2 Heavy Melt. Steel	34.50
No. 1 Busheling	34.50
Nos. 1 & 2 Bundles	34.50
No. 3 Bundles	32.50
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings	30.50-31.00
Punchings & Plate Scrap	40.00-41.00
Cut Structurals	40.00-41.00
Elec. Furnace Bundles	40.00-41.00

Cast Iron Grades

No. 1 Cupola Cast	55.00-57.00
Charging Box Cast	56.00-58.00
Heavy Breakable	56.00-58.00
Unstripped Motor Blocks	52.50-53.50
Malleable	68.00-69.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$31.90
No. 2 Heavy Melt. Steel	31.90
No. 1 Bundles	31.90
No. 1 Busheling	31.90
Machine Shop Turnings	26.90
Mixed Borings, Turnings	26.90
Short Shovel Turnings	28.90
Bar Crops and Plate	35.00-37.00
Punchings & Plate Scrap	35.00-37.00
Chemical Borings	37.00-37.50

Cast Iron Grades

No. 1 Cupola Cast	50.00-52.00
Heavy Breakable Cast	53.00
Stove Plate	50.00
Unstripped Motor Blocks	48.00
Clean Auto Cast	50.00-52.00

CHICAGO

No. 1 Heavy Melt. Steel	$39.00-39.50
No. 2 Heavy Melt. Steel	39.00-39.50
No. 1 Bundles	39.00-39.50
No. 2 Bundles	39.00-39.50
No. 3 Bundles	37.00-37.50
Machine Shop Turnings	34.00-34.50
Mixed Borings, Turnings	34.00-34.50
Short Shovel Turnings	36.00-36.50
Cast Iron Borings	35.50-36.00
Bar Crops and Plate	46.50-47.00
Punchings	48.00-48.50
Elec. Furnace Bundles	40.00-40.50
Heavy Turnings	38.50-39.00
Cut Structurals	44.00-44.50

Cast Iron Grades

No. 1 Cupola Cast	67.00-70.00
Clean Auto Cast	67.00-70.00
No. 1 Wheels	61.00-62.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.25-44.25
Malleable	75.00-76.00
Rails, Rerolling	54.00-55.00
Rails, Random Lengths	51.00-52.00
Rails, 3 ft and under	56.00-57.00
Rails, 18 in. and under	58.00-59.00
Railroad Specialties	52.00-53.00
Angles, Splice Bars	53.00-54.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$40.50-41.00
No. 2 Heavy Melt. Steel	37.50-38.00
Machine Shop Turnings	32.50-33.50
Short Shovel Turnings	34.50-35.50

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	65.00-67.00
Mixed Cast	59.00-60.00
Heavy Breakable Cast	55.00-56.00
Brake Shoes	57.00-58.00
Clean Auto Cast	65.00-67.00
Burnt Cast	59.00-60.00

Railroad Scrap

R.R. Malleable	65.00-70.00
Rails, Rerolling	50.50-52.50
Rails, Random Lengths	50.00-51.00
Rails, 3 ft and under	56.00-58.00
Uncut Tires	48.00-49.00
Angles, Splice Bars	55.00-56.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$37.50
No. 2 Heavy Melt. Steel	37.50
No. 1 Busheling	37.50
Nos. 1 & 2 Bundles	37.00
No. 3 Bundles	35.00
Long Turnings	24.50
Short Shovel Turnings	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	40.00
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	63.00
Stove Plate	60.00-62.00
No. 1 Wheels	59.00-61.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	nom.
Axles, Steel	50.00
Rails, Rerolling	53.00-55.00
Rails, Random Lengths	45.00-48.00
Rails, 3 ft and under	53.00-55.00
Angles and Splice Bars	52.00-53.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$25.00
No. 2 Heavy Melt. Steel	*25.00
No. 1 Busheling	*25.00
Nos. 1 & 2 Bundles	*25.00
No. 3 Bundles	*19.00
Machine Shop Turnings	*15.50
Bar Crops and Plate	25.00
Cast Steel	25.00
Alloy Free Turnings	15.50
Cut Structurals	25.00
Tin Can Bundles	19.00

Railroad Scrap

No. 1 Heavy Melting	26.00
Axles	32.00
Rails, Random Lengths	26.50
Uncut Tires	33.50

* Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$26.00
No. 2 Heavy Melt. Steel	26.00
No. 1 Busheling	26.00
Nos. 1 & 2 Bundles	22.00-23.00
No. 3 Bundles	22.00-23.00
Machine Shop Turnings	19.00-21.00
Mixed Borings, Turnings	19.00-21.00
Punchings & Plate Scrap	26.00-28.00
Cut Structurals	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	40.00
Charging Box Cast	25.00
Heavy Breakable Cast	24.00
Stove Plate	25.50
Unstripped Motor Blocks	24.00
Malleable	30.00
Brake Shoes	30.00
Clean Auto Cast	30.00
No. 1 Wheels	26.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable	30.00
Rails, Random Lengths	21.50
Angles and Splice Bars	23.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
Nos. 1 & 2 Bundles	25.00
Machine Shop Turnings	16.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	28.00
Elec. Furnace Bundles	28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00

HAMILTON, ONT.

(Ceiling prices, delivered)

Heavy Melt.	$22.00
No. 1 Bundles	22.00
Mechanical Bundles	20.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	28.00
Rails, Rerolling	26.00
Bushelings	17.00
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	42.00-48.00
No. 2 Cast	35.00-37.00

* Removed from price control Aug. 9, 1947; quoted on basis of fob shipping point.

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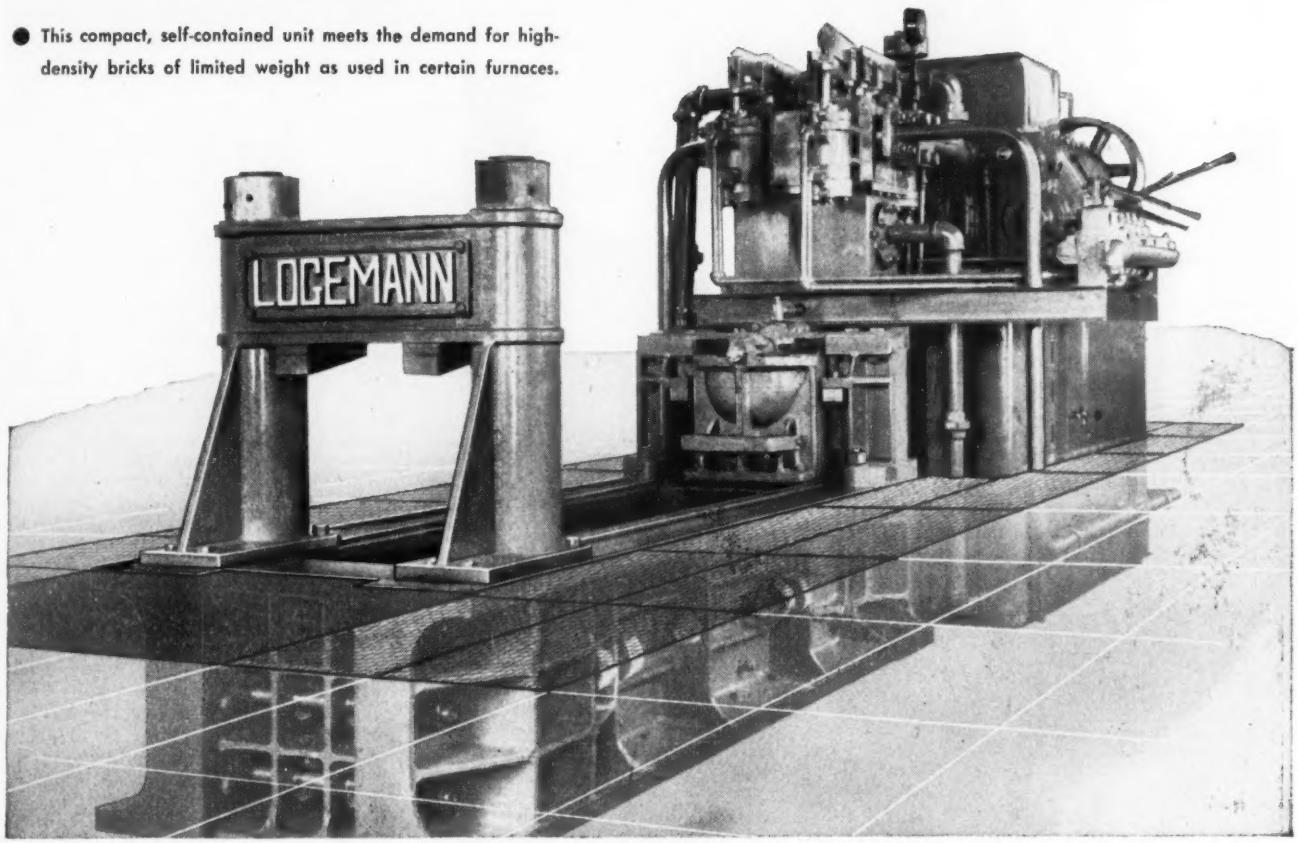

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Sheets, Strip . . .

Trade authorities expect upward trend in prices to develop this summer

Sheet Prices, Page 138

Pittsburgh — Sheet and strip producers state threat of disruption to production schedule has been largely eliminated with the signing of a new coal contract between John L. Lewis and independent operators. There was little doubt early last week that captive mine interests would also come to terms with John L. Lewis prior to July 6, when the coal miners were due to return from their vacation. Even should a coal strike develop in the captive mines early in July, sheet and strip production schedules could be well maintained for at least two weeks.

Sellers ended second quarter with relatively small carry-over tonnage, in contrast to that reported for other steel products. However, producers report no dent apparently has been made in the tremendous pent up demand for flat rolled products. Production to date has failed to meet even the urgent requirements of many consumers. It is often stated that metalworking companies' inventories of sheet and strip constitute the major limiting production factor in achieving full scale operations. Reports of certain household appliances accumulating in dealers hands has not yet been reflected in cut-back of customers' monthly steel allotments.

Reinstatement of price cuts put into effect during May by leading producers and the possibility of increasing prices by others is expected by trade authorities this summer. Increased production costs in the form of higher freight rates and coal mining costs, indicate reversal of the steel industries' position in response to their policy of holding the line on wages. These are believed to be the major factors which will force higher steel prices, possibly extending into many fabricated steel items.

Boston — Based on current receipts of hot-rolled strip, most nonintegrated cold strip producers are oversold for third quarter and beyond. Committed on orders at capacity, producers are receiving hot material at a rate hardly more than 50 per cent of that level. This applies to carbon grades, alloys approximating demand and capacity. Carbon rolling schedules are subject to frequent adjustment to match hot strip available for cold reduction. While third quarter schedules are filled, some fourth quarter allocations have not been taken up. Some low carbon cold-rolled strip is being sold on a cost-plus basis, six per cent being added to costs. Demand for alloys is active, notably for roller chains. Carbon sheet volume, both hot and cold-rolled, will shrink this quarter. There are a few exceptions in electro-coated hot-rolled, but allocations of other grades are generally lower with several producers offering no hot-rolled carbon. Aircraft demand is stimulating activity in stainless and chromium-molybdenum alloy.

New York — It will take most sheet

producers at least a month and some six weeks to get caught up on arrearages. All this is being reflected in quotas which have been set up for the third quarter. An exception is stainless sheets, although mills entered the current quarter one to three weeks behind on their shipping schedules. Producers anticipate increasing production of sheets and strip as the year progresses, but see little prospect of materially relieving the situation before the second or third quarter of next year, as demand will likely continue well in excess of supply. As a matter of fact, supply may be retarded by the stepping up of defense requirements, which would cause diversion of steel to heavier products.

Philadelphia — Sheet consumers continue to seek more tonnage than is available and, in general, look for no improvement in supply for some months to come. In fact, some consumers doubt if there will be any material easing before the last half of next year. Meanwhile, deliveries on stainless steel are becoming more extended. In stainless strip, one leading producer is sold out for the remainder of this year.

Cincinnati — Most of July sheet production here will be required to ship carryover tonnage. Greatest volume is in hot-rolled with carryover probably equivalent to more than four weeks' output. Prices are unchanged but are being discussed in connection with likelihood of higher fuel costs.

Birmingham—Sheet production remains substantially at capacity in this district. Demand, however, holds so insistent that considerable carryover into the third quarter is reported. Prospects for improvement this year in the sheet supply situation are not good, even though additional mill capacity is scheduled possibly for the closing days of the fourth quarter.

Plates . . .

Plate Prices, Page 139

New York — Demand for plates exceeds all peacetime levels, with this product in almost as stringent supply as sheets and strip. Most mills are behind a month or so on their commitments, and consumers are having difficulty obtaining much relief from jobbers. Oil company demands are especially pressing, standing out among those from a diversity of sources.

Philadelphia — One district plate mill suspended rolling operations at the beginning of last week for a period of two weeks for vacations and another mill expects to close down for all of the current week. Both, however, will continue ingot production. Other plate makers expect to stagger their schedules with a view to keeping rolling mills going. Producers generally entered the new quarter with about one month's carryover. One, however, had arrearages equivalent to only about two weeks' production, due to careful scheduling. Plate demand continues strong.

Birmingham—Plate users are looking far afield, as usual, for whatever they can get to piece out their requirements in the face of contin-

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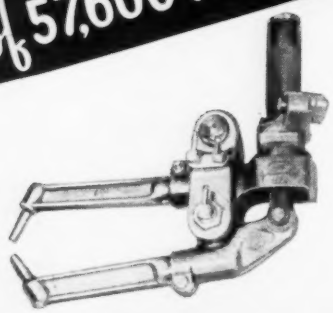

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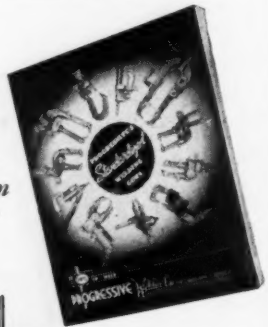

IT PAYS TO WELD

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ued inability to do so from local sources. Buying efforts have been even more frenzied in the past few weeks as the Gadsden situation develops, but only scattered tonnage has been brought in, it is reported.

Steel Bars . . .

Alloy bars become increasingly tight. One seller sets up quotas

Bar Prices, Page 138

New York — Alloy bars are becoming increasingly tight, with little available for shipment in the third quarter. One large producer for the first time since the war has set up quotas for the quarter, with all allotments made. While others have not followed the same procedure, most are almost as closely committed. One interest has some electric furnace alloy available for September, but expects to be closed out within another week, and has nothing available in the open-hearth grades before November.

While requirements are being stepped up, some of the increase in demand is ascribed to protective buying—buying based on the possibility of a shortage later. It is this character of demand that influenced the one producer to set up allotments for third quarter, and is causing others to scrutinize all inquiries carefully. In some cases, inquiries have been traced to a desire to substitute alloys for carbon grades, because of the shortage of the latter. This also is being discouraged by the mills.

Consumers of hot carbon bars in general report tonnage as scarce as at any time since the war, and some are willing to even include the war period. The particularly discouraging feature to them is that no early improvement is in sight. Cold-drawn bar consumers find deliveries becoming more extended, with some sellers having little to offer over the remainder of the year. Contributing to this stringency is the fact that cold drawers themselves are having difficulty getting an adequate supply of hot bars.

Boston — Heavy carbon flats and rounds are difficult to obtain and bars generally have tightened for third quarter; allocations are affected by carryovers, which range up to one month production, and production losses due to mill vacations. Open-hearth alloys are becoming more extended with some producers' November schedules filling. Cold-finished order backlogs are heavier for sizes under three inches with deliveries extended to November-December on some small sizes. More bar tonnage is earmarked for specified programs, including car building, and the volume of hot-rolled carbon for general distribution is shrinking. Although consumer inventories are generally moderate, lack of balance, notably with bolt and nut producers, is the major difficulty.

Philadelphia — Some leading sellers of cold-drawn bars are booked up for the second half of this year and one is entering orders for shipment early next year where old, established customers are involved.

Alloy bar deliveries also are becoming more extended, with some sellers booked well into the fourth quarter on open-hearth grades. Meanwhile, pressure for hot-rolled carbon bars is strong, with producers booked solidly for the third quarter and accepting no tonnage for shipment beyond.

Wire . . .

Wire Prices, Page 139

Boston — That price increases in some wire products, notably specialties, is imminent is predicated on refiguring of costs by some producers who did not follow the reductions in May. Costs of producing these and other items have mounted since and additional increases are ahead. Demand for all types of wire is heavy, only wire rope and music wire of the major products being in balance. Most mills could handle additional volume on both. No substantial progress is being made against backlogs. Third quarter carryovers will be as heavy as at the start of the second and no ground will be gained in the near future due to vacations. Consumer inventories are generally limited or out of balance. Screw stock demand is heavy with rod allocations lower, although partially offset by more finished wire in some cases. Demand for screws has slackened mildly and some plants are making inroads on backlogs.

New York — Demand for welding rods has increased and consumers are taking full allocations on other products. One eastern producer is on a monthly basis for third quarter instead of allocating for the full period with some increase in tonnage for August over July thinly spread among numerous consumers. Demand for cold-heading wire for nails is heavy. Among wire products, only rope volume is sought by most mills. Rod supply appears to have stabilized at recent allocation levels; tonnage is under requirements of some users, but there is less fluctuation in quotas.

Birmingham—Even though a substantial and steady volume of wire products move from mill to users and jobbers, the total seems but a trickle when spread over the territory. Jobbers say they are hard pressed to even partially satisfy regular users by doling out their total receipts. Agricultural wire is in especially brisk demand.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 138

Boston—More steel is being bought directly by state highway departments and furnished contractors, the latter experiencing difficulty in filling needs without allocation. For its highway program, Connecticut has placed contract for 1400 tons of paving mats, although the contractor will purchase 340 tons, substructure, Housatonic bridge, Shelton-Derby, closing July 19, Hartford. Pending federal aid approval on the general contract, 1640 tons of bars, East Boston express highway, have been tentatively placed. Inquiry being estimat-

ed is in excess of district quotas on reinforcing bars.

Seattle — Reinforcing bar production is below normal due to annual overhaul and mechanical difficulties at one of the plants. With substantial backlogs awaiting delivery, new business is not being sought and none was reported last week. However, demand continues insistent, particularly in small tonnages for construction projects. Much reinforcing tonnage is pending.

Tubular Goods . . .

Pittsburgh Steel Co. advances oil well tubular product prices 26.8 per cent

Tubular Goods Prices, Page 139

Pittsburgh — Pittsburgh Steel Co. has announced an average increase of 26.8 per cent in its oil well tubular products, not including drill pipe. The price advance, effective July 6, is held necessary to offset substantial increase in production costs and to make it possible for continued production of these items to meet urgent needs of its customers. Company officials stated continued production at price levels now in effect would be economically unsound and could result in ultimate diminution of such supplies for the consumer. This is the first price action on these products taken by the company since Aug. 7, 1947, and approximates 29 per cent advance on oil well casing with oil well tubing up about 25 per cent. Some trade authorities believe the advance also anticipated wage increases for company's steelmakers this summer. Other pipe producers are expected to also advance prices within the near future, although such action likely will be delayed pending final decision in regard to anticipated wage boosts for the steelworkers and agreement with John L. Lewis in regard to operation of the "captive" mines.

Seattle—Demand for cast iron pipe is slow, due to deferred deliveries. Other types are available on better delivery terms and some normally cast iron business has been diverted.

Structural Shapes . . .

Structural Shape Prices, Page 139

New York — Structural activity is being fairly sustained, with fabricators' backlogs ranging five to six months. However, promises would be better were it possible for the shops to obtain a better supply of shapes. Fabricators' inventories are unbalanced and warehouses are not giving the assistance desired for the obvious reason that they, too, are not getting in a sufficient supply of tonnage from the mills. As long as the mills find more profitable outlets for their steel in other directions, the current stringency in shape supply is likely to continue.

Boston — Bulk of structural inquiry active is for bridges. While public works account for the bulk of tonnage, small-lot private inquiry about equals plain material allocations to district fabricating shops. The East Boston express highway will ultimately take close to 3,500 tons; bids are in on the first section, 8500 tons, and inquiry for the second 5000 tons is expected soon. Plain material volume will be reduced this quarter due to drastic curtailments in July. Bridge repairs are mildly stimulating demand for steel grid flooring.

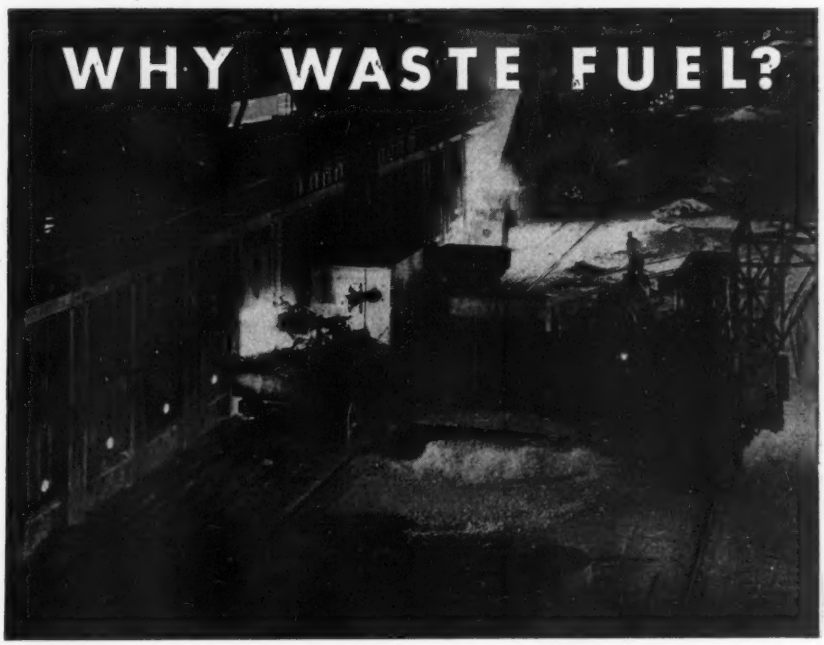
Philadelphia — Fabricators report difficulty in balancing stocks and assert that shape mills are behind three to four weeks on commitments. Outstanding in the local structural market is a 3000-ton power house development, with bids due July 12, and a 2800-ton hospital addition award.

Seattle — Demand for shapes is unusually strong but local fabricators are unable to bid on large projects because of the continued shortage of materials. Inventories are low and allocations are small and uncertain.

Tin Plate . . .

Tin Plate Prices, Page 139

Pittsburgh — Reinstatement of the 10 cents per base box price reduction on tin mill products, announced by nearly the entire industry last May, is indicated within the near future. It is contended that integrated mills have been faced with a continued increase in production costs despite their effort to stem the upward price spiral this spring. They point out that the advance of 9 cents to $1.03



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per pound for pig iron was greater than anticipated earlier in the year, while freight rate increases have added materially to cost of incoming raw materials and put some interests at a more competitive disadvantage in regard to freight absorption on shipments to remote points. More recently, the integrated companies will have to meet higher coal mining costs, estimated at 40 to 50 cents a ton, which translated into coke with additional other cost factors will approximate $1 to $1.25 a ton for coke. There is also the early possibility of the industry joining the apparent 1948 wage pattern of 10 to 15 per cent.

Producers have been able to supply sufficient tin mill products for the perishable food packs, but have fallen far short of meeting general line can requirements. The Industry Advisory Committee is scheduled to meet in Washington July 13, at which time fourth quarter export directive tonnages are expected to be major topic of discussion. At present no change in quarterly exports for that period is indicated.

Scrap . . .

Seasonal shipment declines and desire to build winter stocks put pressure on formula prices

Scrap Prices, Page 144

Pittsburgh — A slight decline in scrap shipments is reported, due in part to vacation schedules among both metalworking companies and complete shutdown of plants by small producers for the same reason. Mills' stocks are adequate to sustain current operating schedules, but there is some concern over inability to augment inventories for winter months. Some producers dipped into stocks during June, in sharp contrast with substantial accumulation of material during preceding two months. Formula prices still prevail on new commitments which generally involve small lot purchases. Indicated upturn in coal, coke and other commodities may not develop in scrap quotations, for this item is higher than other commodities in relation to percentage increase since prewar. It is also pointed out that scrap-pig iron price relationship is still out of line, and it is further argued that higher prices do not generate more scrap. Supply of turnings in relation to demand has increased considerably in recent weeks, with result that dealers are finding this item difficult to move. Similarly some price weakness is in evidence for rails. One sale for rails 3 feet and under was reported at $60 last week, a decline of $1 a ton.

New York — Brokers' scrap buying prices are unchanged, although undertone of the market is strong with the movement of material tighter due in part to seasonal influences. Pittsburgh and eastern Pennsylvania consumers are pressing for tonnage.

Boston — While the bulk of heavy melting steel scrap is selling at the formula, or $31.90 shipping point, some tonnage has moved at $34 and even higher prices are bid. High bid on approximately 600 tons unprepared, accumulation at the Boston Navy Yard, was $33.17 per gross ton shipping point; light iron, an estimated 300 tons, brought $30.97. Although several larger consumers of cast scrap are not buying, demand is keen enough to force some yards to dip into stocks and collections of both open-hearth and cast are beginning to slow down.

Philadelphia—Scrap shipments are lighter and, while there are no price changes in the steelmaking grades, the market undertone is strong. Several grades of cast iron scrap have advanced. No. 1 machinery cast is now $67 to $68, delivered; charging box and heavy breakable cast, $63 to $64; and clean auto cast, $64 to $65.

Reduced flow of scrap is ascribed primarily to seasonal influences, with vacation periods interfering with the output of manufactured scrap and with certain collectors of miscellaneous scrap shifting to other jobs during the hot weather. Furthermore, ship breaking operations are being retarded by the new policy of the government in releasing fewer ships for scrapping, as a matter of national defense. One large eastern ship breaking yard would have difficulty even closely maintaining operations were it not for the importation of scrap, particularly from the Pacific. Another factor which may have a bearing on the reduced flow is said to be a disposition on the part of some yardmen to hold up scrap in anticipation of higher prices later.

Detroit — Demand from mills for open-hearth scrap is unrelenting even in the face of comfortable inventories, apparently reflecting a determination to start now to build good stocks for next winter. Rejections are running high and there is no disposition on the part of melters to accept anything off-grade. Cast scrap continues weak in the face of almost total lack of buying except for occasional specialty items. Great Lakes Steel Corp. is using a small amount of scrap in bessemer converter blows, where pig iron is duplexed before refining in open hearths. Carbon is blown down to about 1.5 per cent and the scrap serves as a sort of sweetener. Bulk of scrap going to Rotary Electric Steel Co. here originates in plants of Hudson, Briggs and Chevrolet on ingot conversion arrangements.

Buffalo — Reports that some dealers are paying above formula prices to cover sales points to a number of deals with steel consumers. Dealers are none too willing to talk for publication about such arrangements with mills and steel buyers, but it is common knowledge in the trade that dealers have gone into the open market with bids above the formula. Some concern is expressed that these deals may eventually upset the formula market. Adding to such deals locally is the continued practice of two outside buyers who have been taking substantial tonnages from the midstate section at prices ranging from $1 to $1.50 above ceiling. While some confusion exists in the steelmaking grades, No. 1 heavy melting remains an independent market here with new business reported within a range of $44 to $45 a ton compared with a formula price of $39.75 for No. 2 material.

Cast scrap showed further weak-

ness with the spread on mixed cupola becoming $55 to $62. Top quality No. 1 cupola cast was quoted $64 to $65. The turning market was unchanged here, but consumers at Niagara Falls were paying $1 above the formula for machine shop offerings. The season's first water scrap from the eastern seaboard arrived via the Barge Canal with seven barges carrying approximately 7000 tons. Shipments from the upper lakes ports are light.

Cincinnati — Undertone of the scrap market is strong, but prices are unchanged. A temporary lull in buying of cast grades developed last week, due to the foundry vacations scheduled early in July. Mills are taking tonnage freely at formula prices.

Birmingham—Some easing off in cast grades is noted as vacation schedules get under way. A slackening in agricultural scrap is reported since most farmers are occupied in the field and have turned in but scant tonnage in recent weeks. Heavy melting at $37.50 is moving in regular and substantial lots, but a rather wide variation in prices over the range of specifications is reported.

Seattle — Mills report good receipts of steel scrap. Inventories are increasing and the outlook is improved for the immediate future. Stocks are accumulating in the Portland flood districts and when transportation is restored this backlog will come to Seattle mills. Cast iron scrap is in fair supply. Prices are unchanged.

Iron Ore . . .

Iron Ore Prices, Page 140

Cleveland — Consumption of Lake Superior iron ore increased more than 33 per cent during May to a total of 6,656,498 tons from 4,976,069 tons in April, but was slightly below the May, 1947, total of 6,884,803 tons, according to the Lake Superior Iron Ore Association, this city. Consumption for the first five months came to 31,764,053 tons compared with 33,730,770 tons in the like period a year ago. The United States alone used 6,411,189 tons in May against 4,744,281 tons in April, making the five-month total 30,548,370 tons against 32,522,988 tons in the like period last year.

Total stocks of ore as of June 1 amounted to 22,058,158 tons compared with 17,124,962 tons a month earlier and 17,618,341 tons a year ago. Of the June 1 total, 2,172,932 tons were on United States Lake Erie docks and 19,885,226 tons at furnaces, including 19,101,335 tons in the United States and 783,891 tons in Canada.

On June 1, 169 furnaces were in blast in the United States, a gain of 7 for the month, while 19 remained in blast in Canada. As of June 1, 13 furnaces in the United States and 1 in Canada were idle compared with a total of 21 idle on May 1.

Shipments of Lake Superior ore from upper lake ports totaled 2,738,550 tons during the week ended June 28, making the season's total to that date 29,914,609 tons. Shipments from United States ports for the week ended June 28 totaled 2,690,291 tons, making the season's total 29,549,821 tons, or an increase of 4,969,980 tons over the like 1947 period.

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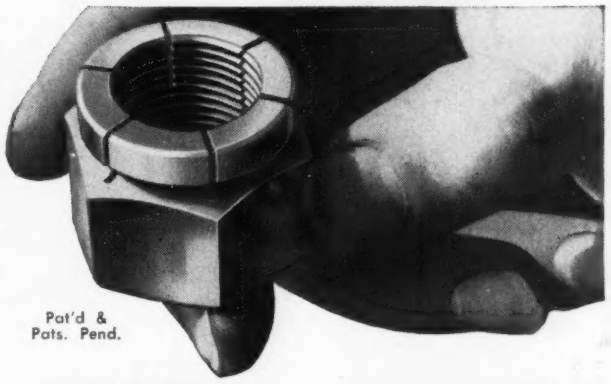

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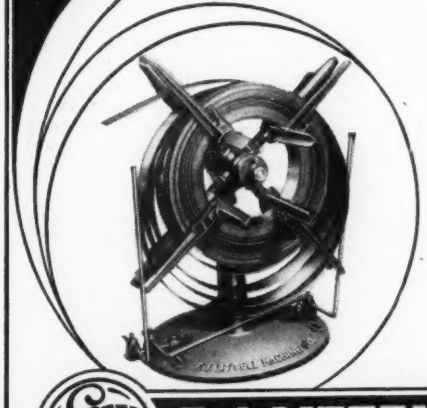

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Pig Iron . . .

Pig Iron Prices, Page 140

New York — While a number of foundries closed down last Friday for a vacation scheduled to run through the following week, all have arranged to take in such raw material shipments as may be received. A special effort will be made to handle such pig iron as may come in, for the outlook is remote for any appreciable easing in supply for some time to come. The situation in coke is a little less pressing, notwithstanding the current vacation holiday at the coal mines which has adversely affected beehive production.

An increasing amount of foreign iron is reported along the eastern seaboard, although still expensive and modest in quantity. Several orders of Belgian foundry iron have been booked in this district recently, at around $90, New York. Meanwhile, several shipments of Dutch iron are being received here and in the eastern Pennsylvania district.

Boston—Shipments of iron to New England, already meager, have declined further. One eastern Pennsylvania furnace supplying some tonnage is down for repairs and little volume, other than silvery, is coming in from Buffalo. Foreign iron is offered at $85, dock, and the delivered price carries substantial freight, the iron being at a port other than Boston. There are no takers. Melt will be lower this month due to vacation shutdowns and demand for castings by the machine tool industry is slow. Most shops down for vacation will continue to take in their quota of iron from the Mystic furnace which is supplying the bulk of tonnage to district consumers.

Philadelphia — Most foundries have closed down for a week for vacations, although having arranged to take in such shipments of raw materials as may come their way. The supply situation in coke is no longer acute but, in pig iron, supply is extremely tight.

Pittsburgh — Many foundries here are scheduling two weeks vacation for their employes early in July, although some are taking one week now and plan to schedule the other week later in the summer. Shortage of pig iron continues to be the major factor retarding activity, with many interests using up to 30 per cent cast scrap in their melting operations. Tight supply situation in coke also persists, but not to extent of that prevailing in pig iron. Some foundries were temporarily pinched for coke supplies last week, with shutdown of beehive ovens during vacation period of operators which coincides with that of the coal miners. However, most foundries will have sufficient coke stocks to tide them over this period.

Keener competition is developing among gray iron foundries, attributed to the fact that acute scarcity of steel and malleable castings components is retarding metalworking production schedules. A number of foundries here have not applied for priority assistance under pending federal housing program which would set aside a stipulated tonnage of iron for this purpose. These interests believe merchant iron producers are doing the best job possible under the circumstances, and contend they would be no better off under government allocation. There is nothing to prevent pig iron producers, for example, of sharply reducing iron allotments for other end uses to those companies getting more iron under the housing program.

Buffalo — Foundries can expect no improvement in allocations of pig iron this month, according to merchant iron producers in this area who plan to adhere to regular shipping schedules despite the holiday and vacation periods. Melters, however, will be given an opportunity, in some instances, to accumulate a small inventory due to the fact that a number of them will be shut down from July 2 to July 12 for holiday-vacation periods. Foundries will receive their regular shipments during the shutdown periods.

Iron supplies will fall far short of demands during July. Ingot makers are also exerting heavier pressure for shipments. Worthington Pump & Machinery Co.'s Buffalo plant, one of the biggest tonnage casters in the area, will resume operations July 6 following an eight-week strike tieup.

Cincinnati — Pressure for pig iron has not diminished even though many melters are scheduling vacations for early this month. The foundries, however, will take in every pound shipped in hopes of gaining a little stock for time of resumption. Oven foundry coke is also tight, but needs of regular customers are being met. The market is discussing possibility of price changes due to the coal mine situation.

Birmingham—Blast furnace interests, although attempting an equitable distribution of their product, have been driven to the point of a simplified, f.o.b. furnace practice which has resulted in a much larger proportion of iron remaining in the general territory. Production continues apace but is not even approximately in line with needs. Iron-dependent industries, some of which are in or planning vacation periods, will take every pound they can get in the hope some sort of inventory can be accumulated.

Seattle — Foundries report a seasonal recession in demand for their products, but operations continue above the average rate for this time of year. Some small shipments of off-grade pig iron have reached this market, but plants are expecting resumption of regular shipments from Geneva in July, although the amount available has not been announced. Cast iron scrap is reaching plants in sufficient tonnage to meet current demands.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 140

Pittsburgh—The $1 a day advance in coal miners' wages plus 10 cents a ton increase in the welfare contribution funds is expected to increase costs of producing bituminous coal between 40 and 50 cents a ton. Coke producers are not only faced with higher coal prices, but undoubtedly have to raise wages for beehive op-

erators and truck drivers. Estimates of pending increase in coke prices range from $1 to $1.25 a ton.

No interruption in coke production is indicated after July 6, the date miners are due to return from their vacation. While "captive" mine interests have not yet come to terms with John L. Lewis, some agreement is expected prior to that date. Foundry coke supply since the coal strike this spring has been barely adequate to sustain even the restricted rate of operation. Little if any byproduct oven coke is available to foundries in this area.

Refractories . . .

Leading producers increase prices 5 to 10 per cent to offset higher costs

Refractories Prices, Page 140

Pittsburgh — Leading refractory brick producers have been forced to increase prices 5 to 10 per cent to offset increased production costs in form of 13 cents an hour increases in wages and insurance benefits to their employees. Additional nicreased production cost factors include higher freight rates, coal, equipment and miscellaneous supplies.

This price action was put into effect July 1 by Harbison-Walker Refractories Co., Pittsburgh, on magnesite, and on July 6 for all other refractory brick items produced.

General Refractories Co., Philadelphia, will increase its prices effective July 8. Both companies have granted their employees of United Construction Workers Division of UMW a 13 cents an hour package increase, effective July 1, of which 3 cents will go into an insurance program. Up to late last week no wage agreement had been reached with other employees belonging to the AFL and CIO unions.

Most refractory brick producers have announced an f.o.b. plant selling policy as requested by FTC. This move results in still higher prices for some consumers formerly shipped refractories on a freight equalization basis. In adopting this selling practice, producers also announced late last month that they had completely revised extra classifications for special shapes. These extras now vary widely among the producers and have resulted in considerable confusion within the trade. Some extras have been advanced and others reduced, with net change representing an increase approximating 5 per cent.

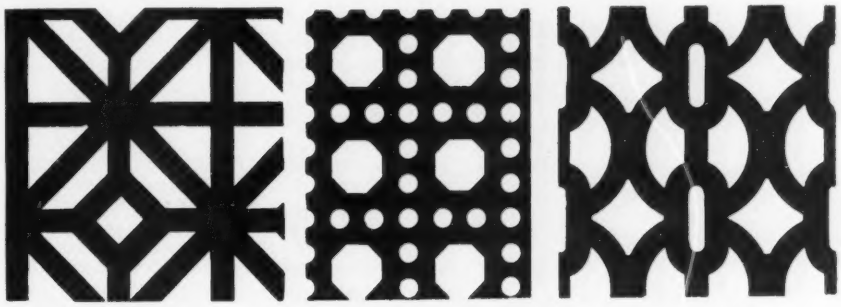
New base price schedules (for 9-inch straights and series) per 1000 units announced by Harbison-Walker Refractories Co. are as follows:

Super Duty: $100 at Vandalia, Mo., Olive Hill, Ky., and Clearfield, Pa.

High Heat Duty: $80 at Clearfield, Pa., Portsmouth, O., Athens, Tex., Bessemer, Ala., Olive Hill, Ky., and Vandalia, Mo.

Intermediate Heat Duty: $74 at Athens, Ky., Vandalia, Mo., Portsmouth, O., Clearfield, Pa., and $66 at Bessemer, Ala.

Low Heat Duty: $66 at Ports-



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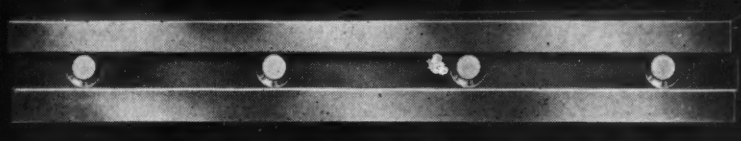

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Silica Brick: $80 at Mt. Union, Pa., Ensley, Ala., and $85 at Hays, Pa.

Super Duty Silica Brick: $95 at Hays, Pa., and Athens, Tex.

Malleable Bung Brick: $90 at Olive Hill, Ky., and Vandalia, Mo.

Basic Brick: Chrome and chemically bonded chrome, $69 per net ton at Chester, Pa., and Baltimore; magnesite, $91 at Chester, Pa., and Baltimore; chemically bonded magnesite, $80 at Chester, Pa., and Baltimore; Metalkase, $80 at Chester, Pa., and Baltimore; and Forsterite, $69 at Chester, Pa., and Baltimore.

Dead Burned (3/8-inch grains) Magnesite: $30.50 f.o.b. Chewelah, Wash., for bulk; $35 in sacks; Magnamix, $69.50 f.o.b. Chester, Pa., or East Chicago, Ind., in single sacks.

General Refractories Co.'s new base prices f. o. b. its plants (see STEEL, page 142, June 28 issue) have been advanced as follows:

Super duty advanced $8; high, intermediate and low-heat duty as well as silica and malleable bung brick were increased $7; basic and magnesite, up $5. These base prices are in line with those established by Harbison-Walker Refractories Co., but this does not apply for special shapes due to the difference in extra classifications.

Ladle brick producers are in midst of negotiating new wage contracts, and no price action is indicated until around July 15.

Warehouse . . .

Warehouse Prices, Page 141

Boston — To meet sustained heavy demand for carbon steel products, warehouse distributors are confronted with lower allocations and low inventories. Flat-rolled, plate and structurals are especially scarce, demand being far in excess of supply. Carbon bar inventories are also becoming more unbalanced. Alloy deliveries are more extended, are also becoming more unbalanced. Alloy deliveries are more extended and demand for stainless is strong, covering the range of products in that grade. Tool steel supply is sufficient for demand which is fair. There are some differences in warehouse prices, recent adjustments not being uniform, depending on suppliers and point of shipment.

Philadelphia — Jobbers expect a drop in business in July to possibly the low point of the year, due principally to vacations and hot weather. Demand has been fairly well maintained until recently. One leading distributor reported a drop of about 5 per cent in June, while another reported a slight increase.

Cincinnati — Shutdowns for the holiday, some of them prolonged, provided no respite in demand for warehouse steel. Mill replacements are tapering at a time when shipments to regular mill customers are lighter, and the combination is making for more and larger orders against the limited stocks of jobbers.

Birmingham—Inquiry as to warehouse prices brings the retort that warehouses have received little steel and are receiving virtually none at the moment. Inquiries for warehouse steel are steady and the potential market, of course, big.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 139

New York — Order backlogs of bolt and nut manufacturers are slightly smaller and, were it not for the difficulty in getting steel, they would be appreciably smaller. Some makers declare that never in their experience—even during war periods—have they had more trouble getting shipments from the mills, especially in sizes ranging 3/4 up to 2 inches. Their problem is further complicated by some mills refusing to sell specification steel and offering instead only commercial grades. In view of the present stringency, these commercial grades are accepted, but with considerable reluctance in some cases.

Backlogs of orders for the smaller sizes average around three months and much less for the larger sizes. Some sellers, in fact, are about caught up on orders for the larger sizes, although government work may tighten the situation somewhat over coming weeks. Sellers generally comment on the decline in export tonnage, the whole matter, they say, boiling down to a shortage of dollars abroad. This is especially true with respect to South American business.

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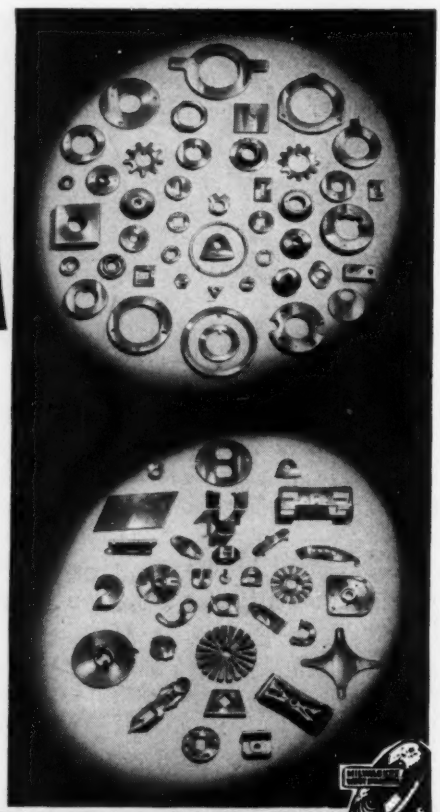

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Iron, Steel Exports Decline

DROPPING again, iron and steel shipments from the United States to foreign destinations aggregated 391,794 net tons in April to bring the four-month total to 1,769,225 tons. January's exports had been 500,767 tons, February's 430,954 tons, and March's 445,710 tons.

Far and away the largest tonnage shipped in April was of tinplate and tagger's tin at 62,168 tons. Ranking next were unfabricated plates other than boiler which accounted for 34,319 tons, black steel sheets for 32,117 tons, seamless casing and oil line pipe for 24,558 tons, and plain structural shapes for 23,159 tons.

Survey Iron Reserves by Air

LACK OF FUNDS is restricting the Michigan Conservation Department's geological survey in the iron country this summer to an airplane survey, with a magnetometer, of the Menominee Range. Customary summer field investigations by small ground parties will not be made.

Beginning where it quit last year, the airplane survey, in which the Michigan department co-operates with the U. S. Geological Survey, is working eastward across Dickinson

county. The survey party includes two pilots and three geologists. Their plane operates at an altitude of about 500 feet, with the magnetometer suspended below on a line.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4615 tons, East New York Bus Depot, Brooklyn, N. Y., to American Bridge Co., Pittsburgh.

2800 tons, neurological building, General Hospital, Philadelphia, through McCloskey & Co., to American Bridge Co., Pittsburgh.

900 tons, state Van Wyck grade crossing, Queens, New York, to American Bridge Co., Pittsburgh.

800 tons, plant, Socony-Vacuum Paint Co., Metuchen, N. J., through Walter Kidde to Bethlehem Steel Co.

700 tons, galvanized steel towers Bonneville transmission lines, to American Bridge Co.; previously reported unstated tonnage to unknown fabricator.

400 tons, building, Harnischfeger Corp., Bergen, N. J., to Austin Co., Cleveland.

340 tons, building in Texas for Luria Engineering Co., New York, to Bethlehem Steel Co.

300 tons, state bridge, Lancaster county, Pennsylvania, to Bethlehem Steel Co.

260 tons, Long Island railroad bridge, Laurelton, N. Y., to American Bridge Co., Pittsburgh.

200 tons, transmission work, Public Service Electric & Gas Co., Carteret, N. J., to Bethlehem Steel Co.

140 tons, New York Central bridge, to Bethlehem Steel Co.

125 tons, Long Island railroad bridge, 225th St., Laurelton, N. Y., through Charles Vachris to Bethlehem Steel Co.

110 tons, hospital, Needham, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.; Rugo Construction Co., Boston, general contractor.

100 tons, building, Hatfield Wire Co., Hillside, N. J., to Albert Smith's Sons, Irvington, N. J.

STRUCTURAL STEEL PENDING

4000 tons, section of McNary dam, Oregon; bids to U. S. Engineer, Portland, Oreg., July 20; postponed from June 22.

3000 tons, alterations and additions, Richmond station, Philadelphia Electric Co., Philadelphia; bids July 12.

2040 tons, Washington state bridge, Wenatchee; General Construction Co., Seattle, low $1,853,864.

1865 tons, division engineer, Public Roads Administration, Portland, Oreg.; bids in, also 275 tons reinforcing bars and 31,000 linear feet, steel sheet piling.

1750 tons Turnagain river public roads project, Alaska; bids opened at Portland, Oreg., June 29.

1200 tons, transmission towers, Tacoma light department; bids in.

800 tons, galvanized steel towers for Bonneville Power Administration; bids in at Portland, Oreg., June 25.

700 tons, bridges for public road projects, Montana; some bids rejected, others, held.

500 tons, bindery and warehouse, Cuneo Eastern Press, Philadelphia, revived with bids due July 7.

300 tons, S. Quackenbush warehouse, Harrisburg, Pa.; bids July 6.

208 tons, state bridge work, Clinton county, Pennsylvania; bids July 16.

200 tons, bridge, Warner Co., Tullytown, Pa.; bids in.

100 tons, turbogenerator foundation, Connecticut Light & Power Co., Devon, Conn.; bids through United Engineers & Constructors, Philadelphia, July 20.

Unstated, bridges in Gallatin, Broadwater,

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* Case studies on request.

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—Chip

Call D. A. Stuart Oil Co. when you need expert assistance. Since 1865, this company has devoted its entire interest to cutting fluids and industrial lubrication. We pride ourselves on the quality of our products and the engineering ability of our representatives. Take advantage of Stuart's complete on-the-spot service and laboratory facilities to solve your cutting fluid problems. Write for booklet "Cutting Fluids for Better Machining."

STUART *oil engineering goes with every barrel*

D. A. Stuart Oil Co.

2735½ S. TROY ST. • CHICAGO 23, ILLINOIS

Prairie and Dawson counties, Montana; bids to state highway board, Helena, at July meeting.

Unstated, six steel bridges for Alaska Railroad; Cascade Contractors Inc. and A. V. Phillips, Seattle, low, $448,196; material to be furnished from surplus government stocks, it is reported.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1400 tons, paving mats, state of Connecticut, to Truscon Steel Co., Youngstown, direct letting.

650 tons, Oregon state college pavillion, Corvallis, to Soule Steel Co., Portland, Oreg., J. G. Watts Construction Co., Seattle, general contractor.

REINFORCING BARS PENDING

925 tons, state road work, Route 28, Section 23-A, Hunterdon county, New Jersey; bids July 15.

750 tons, Public Roads projects in Alaska; bids opened at Portland, Oreg.. June 29.

500 tons, Washington state highway bridge, Wenatchee; General Construction Co., Seattle, low, $1,853,684.

340 tons, substructure, piers and abutments, Housatonic river bridge, Shelton-Derby, Conn.; bids July 19, state highway commissioner, Hartford.

280 tons, state road work, Cranbury township, Middlesex county, New Jersey; bids July 15.

Unstated, 7-story addition to J. C. Penney store, Seattle; S. S. Mullen, Seattle, low bid $447,478.

Unstated, University of Washington School of Music, Seattle; bids to regents, July 27.

Unstated, section of McNary dam, including fishways, spillway, etc.; bids July 20 to U. S. Engineer, Portland, Oreg., postponed from June 22.

Unstated, Washington state patrol station, Tacoma, Wash.; bids to Olympia, July 8; $100,000 project.

PIPE . . .

CAST IRON PIPE PLACED

870 tons, bell and spigot, for Seattle local improvement projects, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago & Northwestern, 50 seventy-ton mill type gondolas to the Pressed Steel Car Co., Pittsburgh, and 19 seventy-ton covered hopper cars to the General American Transportation Corp., Chicago.

Louisiana & Arkansas, 100 seventy-ton covered hopper cars, to the General American Transportation Corp., Chicago.

Western Maryland, 450 freight cars, with 200 fifty-ton steel sheathed box cars and 50 seventy-ton gondola cars, going to the Pressed Steel Car Co., Pittsburgh, and 200 seventy-ton drop-end gondola cars, to the Green Gold Steel Car Co., Green Gold, Pa.

LOCOMOTIVES PLACED

Missouri-Kansas-Texas, two 4,000-horsepower diesel-electric passenger locomotives, to the American Locomotive Co., New York.

Missouri Pacific, 45 diesel-electric locomotives, with 19 going to Electro-Motive Division of General Motors Corp., LaGrange, Ill.; 15 to the Baldwin Locomotive Works, Eddystone, Pa.; and 11 to the American Locomotive Co., New York; the equipment also includes requirements of some of the affiliated lines.

Santa Fe, 10 diesel-electric switching locomotives of 1000 horsepower each, to Baldwin Locomotive Works, Eddystone, Pa.

Union Railroad Co. of Pittsburgh, seven 1500-horsepower diesel-electric transfer locomotives.

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

HAYWARD, CALIF.—Atlas Imperial Diesel Engine Co., 1000 19th Ave., Oakland, plans to build a $1 million plant for the manufacture of containers.

VERNON, CALIF.—General Metals Corp., 5701 S. Boyle Ave., is erecting a drop and press forgings plant adjacent to its present facilities. Due for completion this fall, unit will have a productive capacity of 400 to 500 tons of iron castings monthly.

WHITTIER, CALIF.—Autoweld Corp., 1008 Chico St., El Monte, has acquired two acres at 852 W. Whittier Blvd., and is erecting a 12,500-ft building, first of several contemplated for construction.

CONNECTICUT

EAST HARTFORD, CONN.—United Aircraft Corp., Pratt & Whitney Division, 400 Main St., will build an engine development laboratory here.

KANSAS

ELLSWORTH, KANS.—Cities Service Gas Co., W. R. Morton, secretary, First National Bank Bldg., Oklahoma City, Okla., is erecting a $90,000 gas booster station here.

RIVERTON, KANS.—Empire District Electric Co., James E. Harsh, president, 602 Joplin St., Joplin, Mo., has awarded a general contract to Long Construction Co., Rialto Bldg., Kansas City, Mo., for erection of an addition to its power generating plant here. Cost will be approximately $4 million.

WICHITA, KANS.—Mid-Western Steel Treatment & Forging Co., 1009 South West St., plans to build a 1-story steel treatment and forging plant.

MARYLAND

BALTIMORE—Harbison-Walker Refractories Co., 1200 Patabsco Ave., is erecting a 1½ story building here.

MICHIGAN

CADILLAC, MICH.—F. J. McCarthy Inc., 313 Haynes, has been formed by Floyd J. McCarthy with a capital of $500,000 to conduct a foundry and machine shop business.

DETROIT—Die Cast Machine & Mfg. Co., 22100 Telegraph Rd., has been formed by Frank J. Sambrook with a capital of $100,000 to manufacture tools, machinery and dies.

KALAMAZOO, MICH.—Kalamazoo Steel Furnace Corp., 565 E. Michigan, has been formed by H. E. Orner with a capital of $100,000 to manufacture stoves and allied products.

PLYMOUTH, MICH.—Peerless Industries Inc., 8050 N. Territorial Rd., has been formed by Russell P. Hoffman with a capital of $200,000 to manufacture tools and dies.

STURGIS, MICH.—Sturgis Foundry Corp., 104½ W. Chicago Rd., has been formed by H. J. Sprecken, 3310 Robin Rd., Louisville, Ky., with a capital of $400,000 to conduct a general foundry business.

NEW JERSEY

CAMDEN, N. J.—Camden Coke Co., 418 Federal St., plans to build a $150,000 storage unit.

OHIO

CLEVELAND—Wellman Engineering Co., 7000 Central Ave., has awarded a $100,000 contract to McDowell Co., 3203 W. 71st St., for construction of a factory addition.

TOLEDO, O.—Toledo Scale Co., Telegraph Rd., has awarded a $210,000 contract to George W. Lathrop & Sons Inc., 1510 Montcalm St., for construction of a factory addition.

FRANK SAMUEL & CO., INC.

Harrison Bldg., Philadelphia, Pa.

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ALLOYS

Ferro-Chrome — Calcium Silicide
Ferro-Silicon—Silicon Manganese

PIG IRON
FERRO MANGANESE

Standard—Low Carbon

MANGANESE ORE

Open Hearth Use—Blast Furnace Use

IRON ORES
CHROME ORE

Lump—Ground

ORES

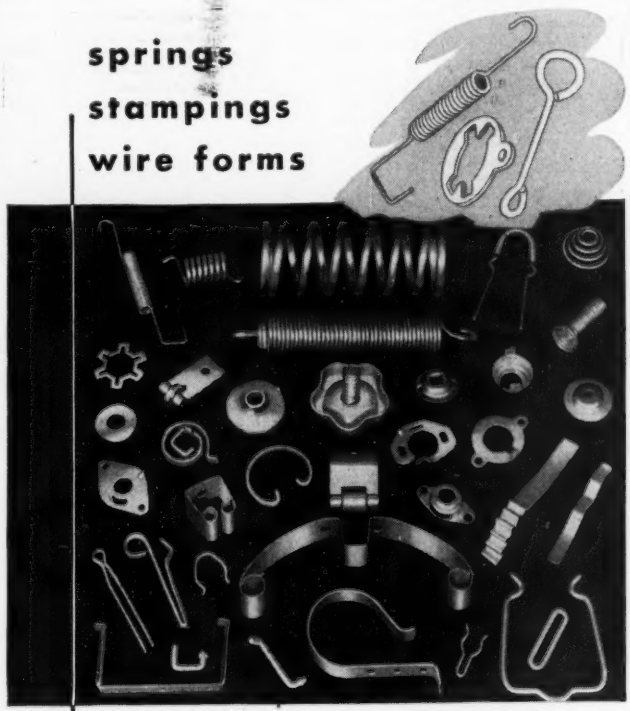
Beryl, Zirconium, Antimony,
Kyanite, Tungsten and Fluorspar

•

West Newton, Mass.—28 Fairway Drive

New York—40 Exchange Place

springs
stampings
wire forms



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47 CARBON BLACK PLANTS • 200 METALLURGICAL INSTALLATIONS
203 ACID PLANTS • 34 PAPER MILLS • 262 DETARRING INSTALLATIONS
195 POWER STATIONS • 71 STEEL PLANTS • 95 OIL REFINERIES
AND MISCELLANEOUS INSTALLATIONS

RC-103

RESEARCH CORPORATION

405 Lexington Avenue, New York 17, N. Y.
122 South Michigan Ave., Chicago 3, Illinois

PENNSYLVANIA

PHILADELPHIA—Asten Hill Mfg. Co., Scotts Lane, has awarded a $1 million contract to Mahony Troast Construction Co., 657 Main Ave., Passaic, N. J., for erection of a limestone manufacturing plant.

PHILADELPHIA—Abrasive Co., Tacony and Traley Sts., has awarded a $70,000 contract to Pownall & Bebhardt Inc., 1505 Race St., for machine shop alterations.

PHILADELPHIA—Joseph T. Ryerson & Son Inc., 5200 Grays Ave., has awarded a $265,000 contract to John S. McQuade Jr., 1318 Parrish St., for erection of a plant.

TENNESSEE

NASHVILLE, TENN. — Nashville Electric Service, 605 Church St., will build a $100,000 service unit.

TEXAS

DALLAS, TEX.—Texas & Pacific Railroad, R. J. Gammie, chief engineer, Texas & Pacific Bldg., plans to build a $200,000 motor service garage.

FT. WORTH, TEX.—Ft. Worth Steel & Machinery Co., 3600 McCart St., will reconstruct its plant at a cost of $75,000.

GRAND PRAIRIE, TEX.—Texas Engineering & Mfg. Co. has awarded separate contracts totaling $90,000 for additional plant expansions.

HOUSTON, TEX.—Turbiville Motors, 4511 Kyle St., has awarded a $375,000 contract to Bellows Construction Co., 716 N. Everton St., for erection of an auto service shop and showroom.

HOUSTON, TEX.—Houston Lighting & Power Co., 1016 Walker St., plans to spend $17,350,000 on generating stations and corollary facilities in the following Texas cities: Anahuac, Angleton, Bay City, Bellville, Conroe, Galveston, Liberty and Waller.

PORT LAVACA, TEX.—Point Comfort & Northern Railroad, c/o Alton & Southern Belt Line Railroad, W. J. Newubling, chief engineer and purchasing agent, 3105 Missouri Ave., East St. Louis, Ill., has awarded a $1 million contract to William A. Smith Construction Co. Inc., Citizens State Bank Bldg., Houston, for construction of 17 miles of line, switchyard, etc., near here.

RIO GRANDE CITY, TEX.—Sun Oil Co., 1608 Walnut St., Philadelphia, has awarded a $1 million contract to Petroleum Engineering Inc., Commerce Bldg., Houston, for construction of a natural gas processing plant in the Sun field near here.

WINNIE, TEX.—McCarthy Oil, Gas & Chemical Corp., Sterling Bldg., Houston, has awarded a $1,800,000 contract to Tellepsen Construction Co., 3900 Clay St., Houston, for erection of a second chemical plant.

WASHINGTON

SEATTLE—J. B. Warrack Construction Co. has received a $377,500 contract to remodel 123 troop sleepers for the Alaska Railroad, for general use in the territory.

ALASKA

KETCHIKAN, ALASKA—Alaska Industrial & Engineering Corp. has been formed by Ben Mullen and others of Juneau to make power and engineering surveys for pulp mill projects in southeastern Alaska.

CANADA

TRAIL, B. C.—Consolidated Mining & Smelting Co. Ltd., 215 St. James St., Montreal, Que., plans to build a $1 million lead smelter here.

COPPER CLIFF, ONT.—International Nickel Co. Ltd., 25 King St. W., Toronto, plans to build a $500,000 plant to produce commercial oxygen and a $5 million plant to combine pyrrhotite with commercial oxygen to produce combustible fuel which will replace coal in smelting operations.

FREEMAN, ONT.—Bonar & Bemis Ltd., 311 Alexander Ave., Winnipeg, Man., has awarded a $200,000 contract to W. H. Cooper Construction Co. Ltd., Medical Arts Bldg., Hamilton, for erection of a plant unit.

MICHIPICOTEN HARBOUR, ONT. — Great Lakes Power Co. Ltd., Sault St. Marie, plans power plant extensions on Michipicoten river, to cost $2 million.

TORONTO, ONT.—Ford Motor Co. of Canada Ltd., Windsor, has awarded $750,000 contract to Pigott Construction Co. Ltd., 1250 Bay St., for erection of a distribution depot on Queen Elizabeth Way.

VALLEYFIELD, QUE.—Marck & Co. Ltd., 560 de Courcelles St., Montreal, has awarded a $250,000 contract to A. F. Bayers Construction Co. Ltd., 5675 Western Ave., Montreal, for erection of four plant units.

McWATTERS, QUE.—Heva Gold Mines Ltd., 24 W. King St., Toronto, Ont., will spend $400,000 on mill construction.

THETFORD MINES, QUE.—United Asbestos Corp., 717 Transportation Bldg., Montreal, will spend $150,000 on development of asbestos fields.

PRICES OF LEADING FERROALLOYS PRODUCTS

(*Concluded from Page* 141)

c.l. and 0.9c for l.c.l.; Western, add 0.35c for c.l. and 1.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Eastern Zone, contract, carload, bulk, 8.7c per lb of briquet, c.l. packaged 9.5c, ton lot 10.3c, less ton 11.2c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Eastern Zone, contract, c.l. bulk 8.75c per lb of briquet, c.l. packed 9.55c, ton lot 10.35c, less ton 11.25c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Eastern Zone, contract, carload, bulk 5.1c per lb of briquet, c.l. packed 5.25c, ton lot 6.7c, less ton 7.6c. **(Small size**—weighing approx. 2½ lb and containing exactly 1 lb of Si). Eastern Zone, carload, bulk 5.25c c.l. packed 6.05c, ton lots 6.85c, less ton 7.75c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.45c for c.l. and 0.9c for l.c.l. Freight allowed. Add 0.25c for notching, small size only. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Eastern Zone, contract, carload, lump, bulk 17.50c per lb of alloy, carload packed 19.0c, ton lot 19.8c, less ton 20.8c; Central, add 0.5c for c.l. and 0.85c for l.c.l.: Western, add 2.55c for c.l. and 2.6c for l.c.l. Freight allowed. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Eastern Zone, contract, carload, lump, bulk 16.25c per lb of alloy, carload packed 16.45c, ton lot 19.35c, less ton 20.85c; Central, add 0.5c for c.l. and 0.75c for l.c.l.; Western, add 2.55c for c.l. and 2.90c for l.c.l. Freight allowed. Spot, add 0.25c.

VANADIUM ALLOYS

Ferrovanadium: Open Hearth Grade (Va 50-55%, Si 8% max., C 3% max.). Eastern Zone, contract, any quantity, $2.90 per lb of contained Va; Central, add 2c for c.l. and 3c for l.c.l.; Western, add 6c for c.l. and 9c for l.c.l. Freight allowed. Spot, add 10c. **Special Grade** (Va 50-55%, Si 4% max., C 1% max.), $3. **High Speed Grade** (Va 50-55%, Si 1.50% max., C .20% max.), $3.10.

Vanadium Oxide: All Zones, contract, less carload lots, $1.20 per lb of contained V_2O_5. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

TITANIUM ALLOYS

Ferrotitanium: (Ti 20-25%, Al 3% max., Si 4% max., C 0.10% max.). Eastern Zone, contract, ton lot, 2" x D, $1.35 per lb of contained Ti, less ton $1.40. (Ti 40-45%, Al 7% max., Si 4% max., C 0.10% max.). Ton lot $1.23, less ton $1.25; Central, add 4c for 20-25% Ti grade, and 2.1c for 40-45% grade; Western, add 13.5c for 20-25% Ti grade, and 7.2c for 40-45% grade. Freight allowed. Spot, add 5c.

Ferrotitanium, High-Carbon: (15-20%). Contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Eastern Zone, contract, 10,000 lb W or more, $2.25 per lb of contained W; 200 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Eastern Zone, contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Eastern Zone, contract, c.l., lump, bulk 6c per lb of alloy, c.l. packed 6.75c, ton lot 7.5c, less ton 8.35c; Central, add 0.25c for c.l. and 1.1c for l.c.l.; Western, add 0.6c for c.l. and 3.95c for l.c.l. Freight allowed. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Eastern Zone, contract, carload, lump, packed 18.4c per lb of alloy, ton lot 19.15c, less ton 20.40c; Central, add 0.6c for c.l. and 1.05c for l.c.l.; Western add 3.05c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Eastern Zone contract, 100 lb or more, 1" x D, $1.20 per lb of alloy, freight allowed. Less than 100 lb $1.30; Central, add 0.75c; Western add 2.9c, freight allowed. Spot, add 5c.

Borosil: (3 to 4% B, 40 to 45% Si), $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Eastern Zone, contract, ton lot, 2" x D, $2.50 per lb of contained Cb, less ton $2.55; Central, add 1.65c; Western, add 6.45c. Freight allowed. Spot, add 10c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Eastern Zone, carload, 12 M x D, carload packed 17.25c per lb of material, ton lot 18.00c, less ton 19.25c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l., and 3.05c for l.c.l. Freight allowed.

Silcaz Alloy: (Si 35-40%, Ca 9-11%; Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Eastern Zone, carload, packed, 1" x D, 39c per lb of alloy, ton lot 41c, less ton 43c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Eastern Zone, contract, carload, packed, ½" x 12 M, 15.0c per lb of alloy, ton lot 15.75c, less ton 17.0c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed. Spot, add 0.25c.

Graphidox No. 4: (Si 56%, Ca 5%, Ti 9%) C.l. packed, 16.50c per lb. of alloy; ton lots 17.90c; less ton lots 19.40c, fob Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%; V-7, Cr 28-32%, Si 15-21%, Mn 14-16%) C.l. packed, 12.95c per lb. of alloy; ton lots 14.60c; less ton lots 15.85c, fob Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 10c, ton lots 10.25c, smaller lots 10.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, fob seller's works, Mt. Pleasant, Tenn.; $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.